Bachelor End Project Sustainable Innovation

0BEPS0 Study guide 2023-2024
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DEPARTMENT OF INDUSTRIAL ENGINEERING & INNOVATION SCIENCES

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TECHNOLOGY

Contents

1. Bachelor Final Project (BEP)

The Bachelor Final Project (BEP) is the last course of the Major Sustainable Innovation. The bachelor project is an **individual project of 10 ECTS** scheduled over two blocks at the end of the bachelor program (third year). During the project you will demonstrate that you are capable of analyzing - under guidance of a supervisor - **a socio-technical problem in the field of Sustainable Innovation**, and that you can communicate the set-up and findings both in a presentation as well in a written report.

The course invites students to individually go through the **entire research cycle for a specific socio-technical issue**. This includes the articulation of clear *research questions*, a transparent and relevant *research methodology*, *data collection* and *analysis*, and the *development of policy*, *strategy and/or research recommendations*. Though students will have to perform individually, and will receive individual grades, multiple students can work and collaborate on the same issue in student teams. Student teams will be supervised by a TIS or P&E staff member.

The **products** for BEP are one *intermediate report* (20%) and one *final report* (80%). In addition, students will write a *topic outline*, a *plan of work* (not assessed- but needs to be sufficient) and give a *presentation*. Students will also be assessed on **professional skills** (PRV presentation skills, PRV writing skills, PRV planning skills and PRV info skills). Students will only receive a grade on their presentation skills and information skills (level 3), which must be sufficient in order to pass the BEP.

NB: Students of cohort 2019 and older will also receive a grade on the PRV's writing and planning, these skills must be sufficient as well in order to pass the BEP

1.1.   Position in the curriculum

BEP is a final project and contributes to the learning outcomes of the degree program (article 3.1 in Program and Examination Regulations Bachelor Sustainable Innovation, 2022).

The project aims at integrating insights and skills that you have acquired in your studies. Among others, disciplinary theory development will be integrated with methods and techniques of data analysis (including the courses 0HV00 and 0HV50), and with the interpretation of results.

BEP it is a learning experience and a bridge to a student's professional future - whether that will be by following a Master studies or starting a professional career.

Please note that an external BEP (e.g. at a company) is possible, it is fully the student's responsibility however to initiate this.

The learning goals of the BEP remain unchanged, hence it is important to discuss a potential external BEP well with your supervisor. This way, your supervisor can judge whether he/she can supervise the project and whether all requirements of the BEP are met. Additionally, note that an external BEP usually takes more time and effort, this cannot be rewarded with extra ECT's as the BEP is set at 10 ECT's.

Learning objectives BEP

Under supervision, students are capable to:
- formulate a research question fitted to the problem and relevant scholarly literature
- perform literature search
- apply and modify relevant scientific theory in order to solve a technology related problem
- make an adequate research design for empirical research
- apply relevant scientific methods for empirical research
- relate interpretation of data to theory and to a policy advice
- individually write a scientific report
- reflect and think systematically

1.2. Topics

During the project you will demonstrate that you are capable of analyzing - under guidance of a supervisor - **a socio-technical problem in the field of Sustainable Innovation**. Topics will be the outcome of input of both supervisors and students. Students can come with their own ideas, but of course supervisors should be able to supervise it.

At this moment, the ethical review of student projects is not mandatory yet. Currently a pilot is running with a specific procedure for student research projects with human participants, the department of IE&IS is not involved in this pilot. Hence, no ethical approval for research projects needs to be obtained (yet).

2. Prerequisites and enrolment

A student can **only** be admitted to this course if he/she has obtained one quartile before the actual start of the Bachelor End Project:

- At least 120 ECTS, of which:
- All first year courses, including the first year track course and 10 ECTS of elective courses
- And at least one of the following courses:
    - 0HV50 (Behavioral Research Methods 2: Dealing with data), or
    - 0SV80 (Sustainable Technology in Society Advanced), or
    - 0SV100 (Economics of Innovation Advanced).

3. Time-line and deadlines

3.1. Course planning

Timeline with start in Q1 (2023-2024)

Deliverables	Deadline		Assessment criteria	Assessment deadline
Introduction meeting	*To be announced*			
Enrollment[*]				
Topic outline	*20 August, 2023*	By e-mail to supervisor and on Canvas	*Not graded – needs to be sufficient*	*10 September, 2023*
Plan of work	*24 September, 2023*	By e-mail to supervisor and on Canvas	*Not graded – needs to be sufficient*	*15 October, 2023*
Information skills training	*t.b.a.*	Subscription on OSIRIS and attendance required	PRV information skills (p. 16)	
Intermediate report (20%)	*29 October, 2023 (No intermediate submission means you cannot hand in the final report)*	By e-mail to supervisor and on Canvas	Intermediate report assessment (p. 19)	*19 November, 2023*
Presentation	*January 2024 (Q2, W7) (time slots to be announced)*		PRV presentation skills (p. 18)	*15 working days after the presentation*
Final report (80%)	*21 January, 2024*	By e-mail to supervisor and on Canvas	Final report assessment (p.20)	*11 February, 2024*
Code of Conduct	*21 January, 2024*	Submission on Canvas	Submission required for pass	
Re-exam	*Ultimately 3 weeks after the initial result is published*	By e-mail to supervisor and on Canvas		*Ultimately 3 weeks after the initial result is published*

More information on the deliverables can be found in section "deliverables" (p.10).

*Enrollment takes place one quartile before the actual start of the project by:
- Registration in OSIRIS
- Students should visit the 0BEPS0 canvas page and complete the 'Supervisor Preferences' questionnaire after reviewing the information slides for available supervisors.

After the admission check (by the CSA) students will be informed regarding their acceptance in the course, their supervisor and topic. **Please note that the BEP can only be done in one semester (two quartiles)!**

More information on the enrollment procedure can be found on
https://studiegids.tue.nl/opleidingen/bachelor-college/majors/sustainable-innovation/curriculum/bachelors-final-project

Timeline with start in Q3 (2023-2024)

Deliverables	Deadline		Assessment criteria	Assessment deadline
Introduction meeting	*To be announced*	Attendance required		
Enrollment[*]				
Topic outline	*21 January, 2024*	By e-mail to supervisor and on Canvas	*Not graded – needs to be sufficient*	*11 February, 2024*
Plan of work	*25 February, 2024*	By e-mail to supervisor and on Canvas	*Not graded – needs to be sufficient*	*17 March, 2024*
Information skills training	*To be announced*	Subscription on OSIRIS and attendance required	PRV information skills (p. 16)	
Intermediate report (20%)	*7 April, 2024 (No intermediate submission means you cannot hand in the final report)*	By e-mail to supervisor and on Canvas	Intermediate report assessment (p. 19)	*28 April, 2024*
Presentation	*to be announced*		PRV presentation skills (p. 18)	*15 working days after presentation*

Final report (80%)	*23 June, 2024*	By e-mail to supervisor and on Canvas	Final report assessment (p.20)	*14 July, 2024*
Code of Conduct	*23 June, 2024*	Submission on Canvas		*Submission required for pass*
Re-exam	*Ultimately 3 weeks after the initial result is published*	By e-mail to supervisor and on Canvas		*Ultimately 3 weeks after the initial result is published*

More information on the deliverables can be found in section "deliverables" (p.10).

*Enrollment takes place one quartile before the actual start of the project by:
- Registration in OSIRIS
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After the admission check (by the CSA) students will be informed regarding their acceptance in the course, their supervisor and topic.

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3.2. Time-line and doing research: research cycle

The extent and depth of projects is such that an average student that is motivated and works hard can pass (grade ≥ 6, so 5.5 is not enough!). The total workload of the final project is 280 hours. The project runs over 2 blocks, equaling 20 weeks. During the examination periods of both blocks (respectively week 9-10 and 19-20) you will have examinations - as parallel to your final project you are expected to take 2 courses in each block. This results in a weekly workload of 15-18 hours per week, or about two days a week.

An even distribution of the workload is critical, as it allows you to follow the other courses. As you have never gone through a complete research cycling before, we have pre-structured it with deliverables and mile stones, see textbox 1. It helps to ensure timely progress and that all aspects of the research cycle will be addressed. The deliverables (plan of work, intermediate report, presentation and final report) are discussed in more detail in the next chapter. We expect that you will hand-in all deliverables on time. In case of flagrant underperforming (not meeting deadlines, poor quality of deliverables), the first supervisor can suggest to discontinue a project. If there are personal reasons for delay (e.g. breaking of a leg), you can request an extension for your BEP project through the examination committee using (Appendix J - Request for Extension BEP).

Doing research, going through the research cycle, is not about collecting some data or applying the methodology that you happen to know. It is a structured approach over different phases, see figure 1. It starts with drawing up a plan on how to tackle a problem, how to gather evidence and proof a point. At the end it includes a phase in which you synthesize (bring everything together, what can you conclude, can you answer the research question) and reflect critically on where you stand. A strict interpretation of the research cycle suggests a linear approach - going from one phase onto the other. However, in practice you will often encounter more complex dynamics: the cycle is followed several times in an iterative mode; or you go back and forth between two phases in order to clarify what is happening. Make sure not to get trapped in data collection.

Gathering more and more data does not make your research more scientific, if you don't have time to analyze your data, draw conclusions and reflect critically on them.

Research question

Theory / framework

Methodology

Data collection

Analysis

Conclusions

Reflection

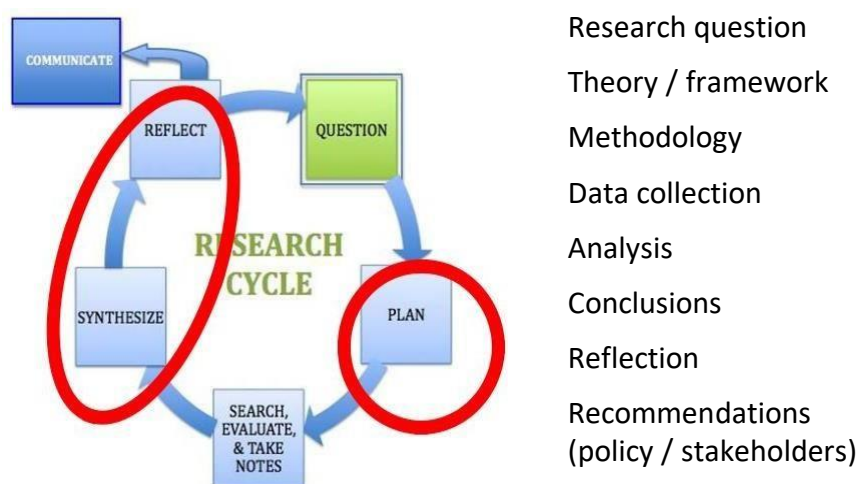Recommendations
(policy / stakeholders)

Figure 1 Conceptual representation of the research cycle (left; Greenwhich High School, ND)[1]; and the typical structuring of the different phases in the final report (right).

4. Roles and responsibilities

The final project is an individual research project under supervision. We stimulate cooperation among students (peer-to-peer coaching) as this can be very helpful and a good way to learn from each other. Here we will explain each of these different roles.

Students need to be dedicated, spent time and meet all deadlines. In addition, we expect from you a professional attitude: you work autonomously; you are respectful in your communication and cooperation; you make appointments and keep them; you learn from feedback and provide others with constructive feedback. As the project is an individual project, there are limitations to the level of cooperation that we allow. You need to have your own specific research question; do your data gathering and analysis; as well as the reporting.

Note: in case there are any circumstances that may influence the progress of your BEP, please inform your supervisor and your academic advisor timely. Also inform your supervisor when you normally get extension for your exams, based on any personal conditions (i.e. dyslexia, ADD, autism), so we can better support you.

Student should hand in a work plan, an intermediate report, and a final report. Students also give a presentation and attend to an information skills training by Information Expertise Centrum.

Each supervisor will supervise 2-5 students. Within this group of students you can cooperate and learn from each other: discuss ideas and theories, explore literature or databases. For the first half of the project it might well be that you have a meeting with your supervisor as a group. Cooperation and peer-to-peer coaching with other students can be on the fly, but it can also be more structured: by peer-reviewing each other's plan-of-work, intermediate reports or presentations. Both assessing and getting feedback are great learning experiences!

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[1] Greenwhich High School; 'Research toolkit'; november 2014 retrieved
from http://www.greenwichschools.org/page.cfm?p=8746

Students are assigned to a **first supervisor**.[2] The first supervisor is your coach on content and process with whom you will have *regular meetings*. He/she also assesses the quality of deliverables and professional skills; and provides you with feedback. He/she first supervisor is also responsible for arranging a second supervisor. During the first meeting with your first supervisor there are several things to discuss: when will you meet; what to send him/her prior to meetings; exchange contact details; how to approach the supervisor in case of problems, etcetera. Discuss the main structure of the final project and the assessment criteria.

Within your BEP, it is the nature of a research problem and the related research question that determines the selection of the approach and methods. It might occur that your research problem and related research question leads to an approach, method, tool or model which you acquired in your technical track of which your supervisor has not sufficient expertise in. Either a 3rd assessor from another department, or additional assistance (for example a PhD candidate from our own department) can be mobilized. Discuss this with your first supervisor. It is the responsibility of your first supervisor to assess his/her capabilities and field of expertise and thus to judge whether additional assistance is needed. It is your responsibility however to setup your BEP and to come up with the nature of your research problem and related research question that determines the selection of the approach and methods. In case additional assistance might be needed, a pro-active role is expected from you where you suggest and, if needed, contact additional assessors with expert knowledge. This creates a shared responsibility which part of the co-construction of the BEP setup by students and supervisors.

First supervisor assesses: intermediate report, final report, PRV presentation (together with ESA, student receives a grade for this skill), PRV planning & writing skills

Each project has a **second supervisor**, second supervisors are assessing the final report. He/she serves as a quality insurance - equal grading over different topics and students. In case the second supervisor holds specific expertise, he/she can be asked for comments and advice earlier on in the project. In special cases, it might be that the second supervisor comes from another group (e.g. a technical faculty) - although we do not facilitate that.

Second supervisors assesses the final report only.

ESA and Data Management & Library (DML): *assessment of PRV presentation and PRV information skills.*

Other responsibilities:
- The CSA takes care of all administrative matters and collects all reports (IEIS.CSA@tue.nl).
- The TIS and PE group are responsible for the quality of the assignments, the supervision and the grading of the projects.
- The coordinators of the bachelor final project (IEIS.education.coordination@tue.nl) take care of the coupling of students, supervisors and projects. If necessary, they organize training for supervisors before the start of the projects. They might provide peer-to-peer coaching for supervisors: coming together, setting the agenda, and learning from each other. They monitor all students on how they score (professional skills and on intermediate and final reports) – to signal trends and potential problems.

- The Examination Committee (ieis.examination.committee.is@tue.nl) regularly assesses the quality of a sample of the reports and their assessments. In case of special personal circumstances (e.g. you break your leg, a close family member deceases, or due to external circumstances beyond your influence your project is delayed), you can ask the Examination Committee for example to extend the deadline of the project by submitting the form on the Sharepoint; or to allow you to work on a same subject during the next round of final bachelor projects.

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[2] The first supervisor is a member of the TIS or P&E group. Typically, supervising a project has a work load of 30 hours total, first and second supervisor combined. This includes preparation, organization, having meetings, reading and assessing documents, etcetera.

5. Assessment and grading

To be assessed for BEP

Assessed	Assessed based on	Assessor	Form (for administration)
Topic outline *Not graded – needs to be sufficient*	*Topic outline*	First supervisor	Not applicable
Plan of work *Not graded – needs to be sufficient*	*Plan of work*	First supervisor	Not applicable
Intermediate report (20%) *Scale 0-10 (0.5 decimal)*	*Intermediate report*	First supervisor	p. 19 (and appendix G) **Note: when the forms are filled in, use the PDF forms on Canvas, <u>not</u> the ones attached in this study guide**
Final report (80%) *Scale 0-10 (0.5 decimal)*	*Final report*	First supervisor and second supervisor	p. 20 (and appendix H, I) **Note: when the forms are filled in, use the PDF forms on Canvas, <u>not</u> the ones attached in this study guide**
PRV information skills *Good- sufficient-poor*	*DML training*	Data Management & Library	p. 15 + p. 22
PRV presentation skills *Good- sufficient-poor*	*Presentation*	First supervisor and/or ESA representative	p. 17 + p. 22
PRV planning skills	*Planning*	First supervisor	P. 9

To pass students need to score overall at least 6.0 (so 5.5 is not enough!). Students can only pass the course if they pass for all PRV professional skills.

5.1. Professional skills (PVR's)

Professional skills are broader skills that are important for each engineer, e.g. writing, presentation, cooperation, reflection, planning and organizing, and finding and processing (scientific) information. In each of the years of the bachelor's program, you have devoted time and effort on these skills. For the bachelor final project several skills are relevant. For handling academic information you will receive a short training. The skills planning and writing will be practiced during the project, on each of which you will receive feedback. The skills presenting will be assessed by an ESA trainer. They offer you the opportunity to learn and strengthen your project. Students need to pass the PRV information skills, the PRV presentation skills and the PRV planning skills level 3 which are assessed within the BEP. Since the PRV's writing is also a substantial part of your BEP, your writing skills will also contribute to the assessment of your BEP report. This is done by means of the assessment form for your final and intermediate report. It will be used by the first assessor by finalizing the grade. Below you will find more details on what is

expected from you per professional skill.

Grading scale for professional skills

• Good (**GO**) (in Dutch: goed): the skill concerned is observable to a more than adequate degree. • Sufficient (**Su**) (in Dutch: voldoende): the skill concerned is sufficiently observable, but there is still a lot of room for improvement. • Poor (**Po**) (in Dutch: onvoldoende): the skill concerned is insufficiently observable.

5.2. Intermediate report and final report

Grading of the intermediate and final report is expressed in half grades at a 0-10 scale. The grading procedure is similar to how gymnastics is graded. If you choose a simple exercise and do it perfectly you have a maximum score of 7. If you aim for a higher score you need to select a more difficult exercise and work more autonomous. Your grade will be based on originality / autonomy / complexity; content / execution; and on reporting.

In "assessment forms" (p. 15) the assessment criteria are specified for respectively the intermediate and the final report. By these criteria your supervisors assess the quality of your work. The criteria relate to the learning outcomes as defined for the bachelor Sustainable Innovation.

To pass you need to score overall at least 6.0 (so 5.5 is not enough!). The overall grade of the project is a weighted average of:
- **20% intermediary report**, assessed by first supervisor.
  (Note: the intermediary report is also used to assess the professional skill writing)
- **80% final report**, assessed by first and second supervisor. If the two supervisors do not come to an agreement, the average of their two grades determines the grade of the final report. You need to score at least 5.0 for your final report.[3]
- **Within the final assessment form**, an average of a 5.5 must be scored for each section (section A – D) in order to pass for the BEP. Compensation within a section is allowed, as long as the average is minimum a 5.5 (compensation between the sections is therefore not allowed). Additionally, it is not allowed to score < 4 for a subsection. Hence, a 4 cannot be compensated.

Note: the project can only be graded after you have posted a PDF of both your final report and the signed 'Code of scientific conduct' (see appendix F) on Canvas; and you have passed the professional skills!! You final report might be checked by anti-plagiarism software.

Our best students can get a designation on their diploma. This is depending, amongst others, on the average grade over all courses and on the grade for the final project. For the designation 'cum laude' it is required that you score a grade of 9.0 or more for your final project; for the designation 'with great appreciation' it is required that you score a grade of 8.0 or higher. For more information - like other requirements - see the PER article 5.5.[4]

In case you fail the exam (<6.0), you will be given the opportunity to revise your report. The revised report has to be handed in within **three weeks** after the student if informed about the

initial assessment (week 18 of the project) and will be assessed by first and second supervisor within 5 working days.

We think that all our students should be assessed at an equal playing field. Re-examination is only offered to those that failed the original exam.

In principle, the same first and second supervisor will handle the re -examination. If this is not possible, they will organize other supervisors to take over. The first supervisor is responsible to communicate to the new supervisors the findings of the initial assessment, how the process went, and any other information that is relevant for the assessment.

In case the student does still not pass the BEP after the revision time of three weeks, and official second attempt of the BEP must be done. The student will be allocated to a new first and second supervisor. In case the student fails the second attempt as well, a request to the exam committee must be submitted for a third attempt.

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[3] With a 5.0 for your final report you need to score a 9.0 for your intermediate report in order to come to an average of 5.8, rounded of to 6.0, in order to pass.

[4] OER = Education and Exam Regulations, available online.

6. Deliverables

6.1. Topic outline

Write a topic outline (max. 300 words). Topics should fit both the student's interest, as well as the supervisor's expertise. The initial description of topics can be rather specific or a more general indication of 'areas of interest'. A specific topic description covers one page – see appendix A for an example. It includes a topic description, a first idea of relevant theory and methodology and references to relevant literature. It serves as a starting point to discuss with your supervisor your individual 'work page' (research question, scope, data, etc.). More general topic descriptions are merely a one paragraph description of 'areas of interest' of a supervisor. It allows you to define an assignment more in line with your own interest – of course in consultation with the supervisor. To inspire you a short list of studies that have been conducted over the past few years is included in appendix A. Make sure that you come up with a more detailed topic description (like the ones mentioned above) before the start of the project. In appendix A of the study guide you will find examples of initial descriptions of topics. Additionally an informative movie will be posted on the 0BEPS0 Canvas page where the process of picking your topic and concept mapping is explained.

6.2. Plan of work

The plan of work (in English!!) typically covers 3-6 pages. It will be assessed by your first supervisor for the PRV planning skills, p. 17 In case that your plan of work is substandard, your first supervisor can ask for a revised plan of work - to be delivered within a week.

A good plan of work serves several goals:
- to show relevance of the topic, attract attention, hook the reader;
- to provide some initial relevant background information;
- to define a good research question and several sub questions;
- to suggest theories, methodologies and data that are relevant for answering these research questions and that you will pursue in your research;
- to define limitations and system boundaries - that what you will NOT do;
- to come up with a planning, including a Gantt chart, to put you in control over your project.

Start with a description of a problem and its context: technologies, stakeholders, issues, scales, and etcetera. It demands that you engage with the subject, explore it from many angles, and look for possibilities and barriers. Summarize some of the key literature on the topic (include references and reference list!!). Be selective on this and limit yourself to the literature that is relevant for your research question. This can be literature that supports your line of research, but also counter arguments or alternative approaches. This helps to position your research, it convinces the reader that you read into the relevant literature and that you master the topic.

Second, you have to define the red line through your research, the logic from start to end throughout your research cycle. You formulate your research question and sub questions that you intend to answer by your research. You define a proper approach for answering these questions. Based on what concepts/theories/frameworks will you approach the problem? What is the most suited methodology? What data are required (newspapers, academic literature, conference proceedings, patents, inventory of demo plants, interviews with stakeholders, etc.) and how will you get hold of them? Try to be specific: what papers are you going to read; how many interviews are you going to conduct; etcetera.

All this requires making choices, recognizing limitations, coming up with relevant assumptions. Make these choices explicit, come with good arguments and reflect on them. Be sure to include practical constraints (time available, organizational problems) as well as methodological constraints.

Planning of your work is important as it puts you in control over your project. It requires that you take a helicopter view over the full project. Describe a detailed planning for the first phase of your research - until the intermediate report; and a more rudimentary planning for the second phase - from the intermediate report to the final report. Reflect on it: has your planning changed, why? In support of planning include a Gantt chart in the plan of work. As you know, a Gantt chart is a matrix with on the horizontal axis the total time span of the project; and on the vertical axis the actions that make up the project – see figure 2. The graph area contains horizontal bars for each task, connecting the period start and period ending. It can further include work load (per task, per week), dependencies between tasks, milestones for deliverables, criticalities, etcetera. The plan of work will also be used to assess the PRV planning skills.

Figure 2 Example of Gantt chart

6.3.   Intermediate report

By your intermediate and final report your supervisor can assess the quality of your research as well as your reporting skills. That is why your report is so important: it is the main output of your research! The intermediate report (in English) covers about 10-15 pages. It is a mix of work done and plans for the future. Your first supervisor will assess the content and the reporting, comes up with a grade (p. 19) and provide you with feedback (strengths & weaknesses). Together with your supervisor you discuss how to proceed. In case of any problems or changes in direction make them explicit: this is the time to discuss them!! No intermediate submission means you cannot hand in the final report.

Your report should contain completed chapters on introduction, problem exploration and conceptual framework / theories. It will be largely based on literature review. But it also contains your most recent findings: preliminary conclusions from data, problems that you run into. Based on these you can discuss on how to proceed. And of course, it contains a more detailed planning for the second half. So, typically your intermediate report will contain the following:

- **Title page** (title, your name & ID number, date, name supervisor; mention 'intermediate report for bachelor final project SI 0BEPS0')
- **Introduction** (Relevance, research question, approach as covered in upcoming chapters. Plan of work can serve as input.)
- **Problem exploration** (problem well described in context; technical and non-technical issues; multiple stakeholders; normative and ethical issues; social and academic relevance; positioning with respect to sustainability. Based on literature study. If this is short you can include it in the introduction.)
- **Theories, theoretical framework, methodology, key concept** (from academic literature)
- **Data gathering, data analysis** (first attempts? Indicative)
- **Discuss first results** (first attempts? Indicative)
- **Reference list** (Covering all sources in an appropriate way. See appendix C)
- **Appendix A Detailed planning second part research**
- **Appendix B** (optional)

Writing a research report is a complex task. It is a skill that requires practice by doing. Often your first version won't make it as it requires all sorts of improvement: writing is an iterative process, going over several attempts. Each time it will become more logical, transparent and to the point. Reporting is especially important for social sciences: the detailing, logic and frames of the text of the report are closely related to that of the research.

The complexity of reporting is too much to handle in this study guide. You bring your personal experience: all the courses in which you received guidelines, learned by doing and received feedback. Also on the internet and in the library many good sources are available that cover the different aspects of writing (logic, style, report structure, paragraphs, sentences, spelling, lay out, etcetera). However, we do offer some starting points. Textbox 3 includes some suggestion on how to start writing: to facilitate that you start, but also to ensure that you do so in a structured approach - the logic in your report is of most relevance! Textbox 4 focusses on the other end of the spectrum: how to finalize a text, take out silly mistakes, and strengthen it further.

Textbox 3 Writing: how to start and structure? (WikiHow, 2014) [5]

- Understand what is expected from you - read this study guide & discuss it with your supervisor
- Keep in mind your thesis statement - the main idea of your report
- Create an outline. Outlines help you visualize what the structure of your full report is or what the structure of each of its chapters will look like. This can be a list of ideas; 1 A4 of your basic ideas, arguments and approaches; or a conceptual map.
- Writing is an iterative process. You start with writing the outline.
  Based on this you start writing a draft text which is covering your data, analysis and arguments - but which you will later throw away as it is too rudimentary (needs more; or less; or restructuring; or ....). Based on your draft text you write a final text.
- Write your body paragraphs. The body paragraphs are where you state your arguments and evidence that supports your thesis. Each body paragraph consists of a topic sentence and evidence

> - supporting the topic sentence. This evidence (arguments, sources, quotes, etc.) comes from your research.
> - Connect / position paragraphs and chapters in relation to each other.

Textbox 4 Writing: how to wrap up? (WikiHow, 2014)[6]

> - Write your conclusion
>   Summarize the thesis; add additional conclusions and insights (overall, synthesis); reflect critically on case, theories, approach, data; come up with recommendations for further research; come up with recommendations for policy makers or other relevant stakeholders.
> - Format your report (title page; good layout; numbered and relevant headings for chapters, paragraphs, figures, tables; put extensive or less relevant material in appendices; etc.)
> - Perform a spelling check
> - Check references in reference list and in text (complete, references in text same as in reference list)
>
> - Read through your report as someone that is reading it for the first time
>   Does the point you are trying to make come across clearly? Does all of your evidence support your thesis? Do you understand the topic after reading the report?
> - Get someone else to read your report
> - Check for spelling, grammar, punctuation errors, and awkward sentences.
> - Read your report out loud
>   Reading out loud will help you to identify any sections of the report that might sound awkward.
> - Put your paper aside for a few days
>   Clear your head before proofreading is a good thing to do. Taking a break from your paper will help you to spot more errors and parts that don't make sense when you come back to it.

6.4. Presentation

In week 15-17 of the project you will give a presentation. You do so for at least your first supervisor, but we suggest you invite others as well (your fellow students for peer-to-peer coaching; possibly the second supervisor as well). Giving a presentation forces you to take a helicopter view over your research: what is the logic over your full research cycle (can you answer your research question?); what can you conclude from your research; what are the implications for further research; what are recommendations for policy makers or other stakeholders involved. It helps you not to get lost in data analysis, but to spent time on synthesis and conclusions as well. Furthermore, your presentation will be assessed by an ESA representative for PRV presenting skills, p. 17. Supervisors will provide feedback on the content of the presentation. The feedback that you will receive offers you the opportunity to strengthen the logic - the thread - of your final report that needs to be handed in a week later.

The presentation itself takes 15 minutes, after which the findings and feedback are discussed. Tips for a good presentation:
- limit the number of slides to maximum 10;
- keep in mind that you address laymen with an academic background, e.g. explain formulas for non-experts;

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[6]WikiHow; 'How to write a report'; november 2014 retrieved from http://www.wikihow.com/Write-a-Report

- to support your presentation use clear slides with not too much text; and a good use of colors, pictures and graphs;
- recommended structure is: intro, context + aim/goal of subject, shortly on methods used, (preliminary) results and conclusions, recommendations for research and stakeholders;
- last but not least: it is a training in time management: try to stick to the allocated 15 minutes.

6.5. Final report

In your final report (in English!!) you cover the complete research cycle, from research question, to approach, to conclusion, and finally critical reflection on the research and its implications. Typically, the report is about 20-25 pages plus possible appendices. In textbox 5 a relevant structure of the report is depicted. Make a PDF version of your report, post it on CANVAS <u>and</u> send it to your first and second supervisor. Also post the 'Code of scientific conduct' on CANVAS. Your report will be assessed on the criteria as mentioned in p.20. You will receive your grade and feedback from your first supervisor. In addition, the first supervisor sends the assessment form to the CSA. The administration checks whether all requirements have been met and then processes the final grade. The reports will be archived in a digital repository, in line with the requirements as specified in the PER regulations. A few good reports from previous years will be made available on CANVAS, so that you can check what is expected from you with respect to research and reporting.

The purpose of your final report is that you start with a research question, you investigate it, and come to an answer. It is most important that your report is structured according to this logic, that there is a clear thread throughout your report. You don't have to follow strictly the set up us you specified in you plan of work at the start - some things may have changed over time, or a different ordering might make more sense. You also don't have to follow a chronological ordering, or to mention all activities. Especially if things are troublesome, they might be frustrating and time consuming. However, you only report on them to the extent that they are relevant for your final project:
  - <u>NOT</u>: 'And then I spent four days on data collection, trying it this way and that way, just to find out that it was completely useless and I could start all over…'
  - <u>POSSIBLY</u>: 'Developments were reconstructed by method x and data y. Although data z looked promising by availability and detailed coverage, it turned out to be impossible to use due to limitations a and b.'
  - <u>NOT</u>: 'I did this analysis, see…; and this analysis; and another analysis'. Emphasis the relevance and logic in your data / analysis!! Why these approaches? What can you learn from them? Why not another approach?

Textbox 5 A typical report structure. Structure is depending on your research: e.g. you might combine introduction and problem exploration; or have multiple chapters on data gathering and analysis.

> **Title page** (title, your name & ID number, date, name supervisor; mention 'final report for bachelor Sustainable Innovation, final project 0BEPS0')
> **Summary** (maximum 250 words)
> **Foreword** (Optional. Whatever you want to say on your research: you motives, joys and grieves.
>   What is your motivation to work on this topic? What is your experience over the bachelor final project?
>   Are there people you would like to thank?)
> **Table of content** (chapter numbers and titles; paragraph numbers and titles; page numbers; are titles informative?)
> 1. **Introduction** (capture reader, relevance, research question, introduce upcoming chapters)
> 2. **Problem exploration** (see also intermediate report)
> 3. **Theories, theoretical framework, key concepts** (from academic literature)

4. **Data gathering and analysis** (one or multiple chapters)
5. **Conclusions, discussion and recommendations** Conclusions
   Reflection and recommendations on research and findings
   Reflection and recommendation for policy makers or other stakeholders (1/2 page or more)
   References (compulsory, complete, variety sources, see appendix C)
   Appendix 1…(optional)
   Appendix 2…(optional)

At the end of your report there are sections on conclusions, discussion and recommendations – each of which we will discuss. Conclusions relate to your initial research question. Preferably your conclusion section stands on its own (you can read it without reading the rest of the report), it is to the point, clear and precise. You can present your conclusions in a structure way by providing an overview of most important conclusions (also those that are not in line with what you expected); and link this back to the literature used. In a strict conclusion section there is no room for speculation.

Start your conclusions with your contribution: what have you shown and what can you conclude. Count your blessings, make your point. In general, each research will come with limitations. However, don't *start* your conclusions with summing them up *before* you have made your point: it is detrimental to your report!! Better: acknowledge the limitations later on, followed by a more constructive approach. Reflect how your research can be improved and what the implications of the limitations were on the outcome. This way you turn something bad into something good!!
In the discussion part there is more liberty to reflect on your research and deliberate on its implications: what are the consequences of your research for future research? What does it suggest for other cases? What are the implications for society or specific stakeholders? Be careful with your formulations - not to overstate your case. Use words like 'suggest', 'might be', 'if we project our findings on…', 'it seems to be'.

Most of our students will become some sort of consultant on technology in a social context (characterized by complex setting, multidisciplinary problems and multiple stakeholder involvement). Therefor we require that you write a separate paragraph on recommendation and implications for policy makers or other relevant stakeholders.

The appendices cover all information that is required to reproduce your research, or that is too detailed for the main body of text. An interested and critical reader will look into the appendices in order to form a judgment on procedures and quality of the work. Examples are:
- collected raw data, complete research findings;
- copies of letters, questionnaires and other forms;
- overview of selection criteria for literature;
- overview and categorization of literature used;
- overview of people interviewed and their expertise / relevance;
- a detailed description of systems, procedures;
- large tables, graphs, flow charts (from own research or from most relevant literature).

Assessment forms

To be assessed for BEP

Assessed	Assessed based on	Assessor	Form (in study guide)
PRV planning skills *Good- sufficient-poor*	Plan of work, intermediate and final report	First supervisor	p. 9
PRV information skills *Good- sufficient-poor*	DML training	Data Management & Library	p. 16
PRV presentation skills *Good- sufficient-poor*	Presentation	First supervisor and/or ESA representative	p. 18
Plan of work *Not graded – needs to be sufficient*	Plan of work	First supervisor	Not applicable
Intermediate report (20%) *Scale 0-10 (0.5 decimal)*	Intermediate report	First supervisor	p. 19 (and appendix G) *CSA*
Final report (80%) *Scale 0-10 (0.5 decimal)*	Final report	First supervisor and second supervisor	p. 20 (and appendig H, I) *CSA*

To pass students need to score overall at least 6.0 (so 5.5 is not enough!). Students can only pass the course if they pass for the PRV professional skills.

Grading scale for professional skills

- Good (**GO**) (in Dutch: goed): the skill concerned is observable to a more than adequate degree.
- Sufficient (**Su**) (in Dutch: voldoende): the skill concerned is sufficiently observable, but there is still a lot of room for improvement.
- Poor (**Po**) (in Dutch: onvoldoende): the skill concerned is insufficiently observable.

PRV information skills

Students have to participate in a training on information skills. This training elaborates on the prior trainings that you had. A 2 hour training will be given in week 2 (week 1-3) of the project. The goal is that you learn and practice how to find scientific information on a relevant topic (innovation science, sustainability, renewable energy, etc.); that you are able to evaluate all the information that you find based on relevance and reliability, so that you know what to include or exclude for your research; and that you can report on retrieved scientific information according to academic standards. More specifically, this training will focus on:

- construct a proper literature list for your bachelor thesis using the Mendeley program;
- the correct use of search results and paraphrasing in a proper way, avoiding the risk of plagiarism. See also the Code of Scientific Conduct – appendix I.

The training will be provided by a librarian (DML). The training is offered on multiple occasions. You will have to register for one of these sessions. Registration can be done on the CANVAS site (course code IV002) . The library also offers a consultation hour, during which someone is available for practical advice.

PRV writing skills

The assessment of the PRV writing skills level 3 is already done in 0SV80. Based on intermediate report, you will receive extra feedback on your writing skills. Since the PRV writing is also a substantial part of your BEP, your writing skills will also contribute to the assessment of your BEP report. This is done by means of the assessment form for your final and intermediate report.

PRV planning skills

We think that you should be able to organize your own activities, in order to manage your project and respect deadlines. For the professional skill 'Planning and Organization' you need to show relevant skills. Based on your plan of work - which is also including a Gantt chart - the first supervisor provides you with feedback regarding your planning skills. The assessment is done based on your plan of work and the ability to adjust your planning as a result of your intermediate report.

The feedback should be discussed with you (= the student).

PRV presentation skills

Information and assessment rubric can be found on CANVAS

Intermediate report

See separate document, appendix G (BEP Interim Form).

This form should be scored by the first supervisor. Starting points are:
- Your supervisor will focus on strengths and weaknesses, on what can be improved - as a take-home message, a lesson for the future.
- Your supervisor will take into account the level of difficulty, the extent to which you worked independently, and the balance between strengths and weaknesses. As a result, the final grade is not the result of strictly summing up the scores below.
- Our assessment criteria link to the competences as described for our full bachelor program, see appendix D.

➔ This assessment and feedback should be discussed with you (= the student).
➔ Your grade has to be mentioned on the assessment form for the final project.
➔ You will receive extra feedback on your writing skills.

Final report

See separate document, appendix H and I (BEP Final Form 1st supervisor and BEP final Form 2nd supervisor).

This form should be scored by the first supervisor and signed by both supervisors. It is considered to reflect the findings of both the first and second supervisor. (The second supervisor will score a separate form, which will be consulted by the 1st supervisor, see appendix I.)

Starting points are:

- The final report is the output of the bachelor final project with a workload of 280 hours.
- Your supervisors will focus on strengths and weaknesses, on what can be improved - as a take-home message, a lesson for the future.
- The supervisors take into account the level of difficulty, the extent to which you worked independently, and the balance between strengths and weaknesses. As a consequence the final grade is not the result of strictly summing up the scores below.
- While grading, appendix C can be used as reference. In the appendix we operationalized our norms for grading: what is a typical '4', '6' or '9'…
- Our assessment criteria link to the competences as described for our full bachelor program, see appendix D.

➔ This assessment and feedback should be discussed with you (= the student).

➔ This assessment form must be sent to the CSA (IEIS.CSA@tue.nl).

7. Appendices

Appendix A Examples of topics of assignments

A1 Overview topics – to inspire you!!

Frequently supervisors only present a short description of areas of their interest. They leave it up to you to express your interest and together co-construct a proper assignment. Experience over the last few years shows that some students find this difficult, as they don't know what sort of topics would be suited. To overcome this hereby a list of divers studies that have been conducted for bachelor final projects over the past few years. We hope to inspire you!!

- **Using the multi-level perspective to augment scenarios for sustainable lifestyles in 2050**;
  1. Which niche, regime and landscape developments can be found in the SPREAD scenarios?
  2. Which problems or pitfalls occur in the SPREAD scenarios?
  3. Which niche developments are at this moment going on in real life that could help in realizing one or more of the SPREAD scenarios?
- **Demand Side Management for peak Shaving, A social cost-benefit analysis**
  How can the private and social costs and benefits for different actors associated with peak demand reduction in households by applying advanced tariffing be fairly distributed?
- **The Contribution of Cycling to the Sustainable Development of Urban Areas** How can cycling contribute to the sustainable development of urban areas? How can policies enable increased cycling rates in urban areas?
  To what extent have policies in Hamburg contributed to achieving a critical mass so far?
  Literature review, statistical databases, newspaper articles
- **Under what circumstances do local citizens have the power to affect the implementation of controversial technologies like carbon capture and storage?**
  Comparative case study drawing upon literature and interviews
- **Success factors of solar PV based renewable energy communities**
- **Patent landscaping of solar cells**
- **Discourse analysis** of mass flows, or environmental problems, or policies
  Quantitative and qualitative text analysis; newspapers, political sources, policy documents, environmental reports companies

- **The bicycle in the political debate: cultural visions in historic perspective**.
  Analysis of political sources; journal; policy documents; cultural text analysis
- **Life-cycling analysis**
  analyzing life stories of cyclists through semi-structured interviews.
- **Globalization and knowledge transfer:**
  the electronics and bicycle industry in Taiwan and the Netherlands
- **The flexibility of energy consuming practices**
  by Social Practice Theory including a small experiment
- **Consumer practices**
  How does having solar panels affect the way a household thinks about and deals with energy? How does being part of an energy cooperative influence the perception of energy in a household or a community? Do people with a HEMS (home energy management system) change their energy consuming practices, and what do they (not) change?
- **Smart mobility – what does it mean?**
  data analysis, algorithms and control systems
- **Measuring sustainable innovation** using patent and trademark data of Energy companies

A2 Example detailed project description

Before you can start with your project (in week 1), you need to have a clear project description to ensure a good start. This project description should be about 1 A4, covering topic, a first idea of theory / methodologies to draw upon, and it should contain references to some relevant literature. Below we have included such a project description that has been submitted a couple of years ago, so you can see what an appropriate structure would be. Note that this one does require some refinement to define an individual focus per student, as is also indicated in the text. Some supervisors have already come up with a detailed description that hardly requires adaptation. Other supervisors have only indicated a more general 'area of interest'. These need to be redefined and focused by discussion and co-creation between students and supervisors. So: you will have more freedom in defining the exact assignment, but it requires a bit of extra work. You will have to do so the month before the actual start of the project.

Title: Changes in bicycles and cycling practices: past and present Visual archeology of cycling

Supervisors:
Frank Veraart & Martin Emanuel
Keyword: Mobility practices, cycling, cultural studies, sustainable mobility transition

Contemporary discussions about technology and sustainability often focus on innovation as the exclusive realm of *new* technology. This Bachelor End Projects tie into a larger project which examines the rise, decline, and partial revival of the bicycle in Dutch and Swedish cities, with the purpose to gain insight in how the re-introduction of "old" technologies differs from the innovation processes for new technologies. It is suggested that such repurposing depends on the material and cultural remnants from the historical co-evolution of cycling practices and planning efforts.

While the planning efforts related to urban transport and cycling are fairly well-known (de la Bruhèze & Veraart 1999; Emanuel 2012), much less is known about everyday mobility practices, including cycling practices. One purpose of the overall project is thus to examine how such practices in Sweden and the Netherlands have emerged, evolved, disappeared, and even reappeared again, during the course of the 20th century. Social practices are understood to consists of different elements: materials (e.g. bicycles, helmets, baskets and gadgets, infrastructures, tools and bodies), competences (skills, know-how, understandings, technique), and meanings (ideas, aspirations, symbolic meanings). Practices emerge, develop, and disappear when connections between these three types of element are made, sustained, or broken (Shove et al. 2012). The proposed project 'Visual archeology of cycling' will be part of an exploratory search for useful materials for studying historical and contemporary social practices.

The project 'Visual archeology of cycling' traces the development of cycling practices (as well as other mobility practices) through a systematic review of photographs from two different streets in one or more cities in a few different time periods. The streets and time periods are identified based on literature about the historical urban planning and developments the selected cities. The analysis combine quantitative and qualitative analysis and will typically involve the number of different road users, their positions in the streetscape, movements, interactions, what kind of bicycles the cyclists have, their equipment, gadgets, clothes and outfits, gender, and what they carry with them and how.

Material & sources:
- Picture postcard collections (private/public)
- Photographs in regional (online) Archives
    - Eindhoven, Amsterdam, Leeuwarden, The Hague, Groningen, Delft, Alkmaar, Amersfoort, Nijmegen, Leiden
- Contemporary photographs taken by the student.

Literature:

Emanuel, Martin, "Constructing the Cyclist: Ideology and Representations in Urban Traffic Planning in Stockholm, 1930–70", *Journal of Transport History*, 2012, 33(1):67–91

Adri A. Albert de la Bruheze en Frank Veraart, *Fietsverkeer in praktijk en beleid in de twintigste eeuw*, Stichting Historie der Techniek / Ministerie van verkeer en Waterstaat, Den Haag, 1999

Elisabeth Shove, *The Dynamics of Social Practice, Everyday Life and how it Changes*, Sage, London, 2012

Key text: Cochoy, Franck, Johan Hagberg, and Roland Canu. "The forgotten role of pedestrian transportation in urban life: Insights from a visual comparative archaeology (Gothenburg and Toulouse, 1875–2011)." *Urban Studies* (2014): 1–20.

Literature: Jordanova, Ludmilla. *The look of the past: Visual and material evidence in historical practice*. Cambridge, 2012; Wagner, Jon (ed). *Images of information: Still photography in the social sciences*. London, 1979.

Appendix B Anti-plagiarism

Plagiarism is each form of using ideas of others without proper referencing. It is not just about copying complete reports or paragraphs – a practice that might be revealed by anti -plagiarism software. Plagiarism can be more subtle: using some sentences of a text, a table or figure without referencing is already considered plagiarism. On the other hand, by proper referencing you can come to a much richer and detailed description and analysis in your report - see appendix C. Plagiarism is forbidden by law (copyright) and against academic standards – see appendix I. Whenever supervisors identify a case of plagiarism they have to report to the Examination Committee (IEIS.examencommissie.IS@tue.nl) according the Exam Regulations - see below.

Exam regulations (2017[7]): article 3.1 Cheating and measures against cheating

Students of the TU/e are expected to conduct themselves in accordance with the values and standards of academic practice, as set out in documents including the TU/e Code of Conduct for Academic Practice and the TU/e Education Fraud Policy. Obviously this means that students must not, for example, commit any form of fraud, including data falsification/fabrication, plagiarism and deliberate attempts to influence the result of an examination.

1. Cheating in tests and in applications for exemptions and examinations comprises any action or failure to act on the part of a student that makes it partially or completely impossible for the examiner to form an accurate opinion of his or her knowledge, understanding and skills, and/or deliberate attempts on the part of a student to influence any part of the examination process for the purpose of influencing the results of the examination.

2. The following are examples of cheating:

2a. identity fraud, for example:

- when a student offers his/her work to others with the aim, knowledge or expectation that this work be submitted it as their own work;

- when a student (also) uses another person's digital identity to participate (for example by using someone else's clicker or login data) or collaborates in this;

- using another person's proof of identity;

- when a student lends his/her proof of identity to someone else;

2b. uses (or has access to) unauthorized resources and/or aids during an examination, such as the internet, a mobile telephone or any other type of media-carrying device. During written or oral examinations, the following actions will in any case be deemed to constitute fraud or attempted fraud:

- having a mobile telephone or any other type of media-carrying device on your desk or on your person;

- using, or attempting to use, unauthorized resources and aids, such as the internet, a mobile telephone, a smart watch, or smart glasses, etc.;

- having any paper at hand other than that provided by TU/e for the test, unless otherwise indicated;

- visiting the toilet (or leaving the exam room) without permission or supervision;

- copying (in any form).

2c. fraud in research projects, graduation reports and project reports, in any case:

- identity fraud;

- falsification/fabrication of research data.

2d. Plagiarism is a specific type of fraud. In these Regulations, plagiarism is taken to mean:

- using or copying another person's texts, data or ideas without providing a full and correct source reference, such as the copying of work of other students or passing it off as your own, or handing in work that was acquired from a commercial institution or work that was written or produced by someone else whether or not for payment.

- the failure to indicate clearly in a text, for example by means of quotation marks or a specific format, that other works are quoted literally or almost literally, even if a correct source reference is provided;

- paraphrasing another person's text without providing a proper source reference;

- copying other persons' media files (or parts thereof) or other sources, software source codes, models and other diagrams, and passing them off, without source references, as one's own work;

- submitting text that has been submitted before (or text that is similar to it) for assignments in.

Depending on the actual circumstances of the case, other conduct may be regarded as plagiarism.

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[7] Identical or similar regulations are included in the exam regulations of other years. Go to http://studiegids.tue.nl, select 'Sustainable Innovation', 'reglementen' for the PDFs of rules and regulations for each year.

2e. When ascertaining whether serious fraud has been committed, the following aspects should be presented to the Examination Committee for evaluation:

i.   the frequency of the fraud: repeated fraud,
ii.   and/or the fraud was deliberate,
iii.   and/or a form of identity fraud was involved,
iv.   and/or fabricated or falsified research data were entered in a research project, project report, Master's thesis or Bachelor's final project,
v.   and/or the fraud was 'complete' plagiarism,
vi.   and/or repeated offenses involving:
        * fraud committed by entering fabricated or falsified research data in a research project, project report, Master's thesis or Bachelor's final project,
        * fraud during inspection,
        * identity fraud,
        * complete plagiarism.
vii.   or there is an incidence of a very exceptional form of fraud

Appendix C Referencing

Proper referencing in a text, a good reference list and the proper acknowledgement of citations is considered essential. Not only by academic convention, but equally important also because it can strengthen your argumentation and bring (the reporting on) your research to a higher level.

Referencing serves multiple purposes, as identified by IJsselsteijn (2007)[8]: "*(i) it allows readers to further explore sources you have consulted, (ii) it shows the depth of your own thinking and process of inquiry, (iii) it allows you and your readers to compare and contrast your position with other people's positions, agreeing with some, disagreeing with others, and (iv) it gives proper credit to the hard work that many people have done before you*".

Using a reference manager can be most helpful - like in Word under 'References' - 'Citations & Bibliography'. TU/e library is offering online information and modules on referencing for professional skills. A variety of referencing styles is used. One of the more popular is the APA style, for which you can find many guidelines on the internet.[9] Most important is that you use references correctly and consistently.

Typical for the field of Innovation Science is the use of a wide variety of sources of data. This does include academic literature, but can also include internet sources, reports, databases, newspaper articles, interviews, photos, patents, technical documents, conference proceedings, etcetera. Each of these can be covered by references, although some might require a specific format. You might want to check guidelines within your style of referencing on this.

Internet is a very rich source of information and especially popular among younger people - including students. Be aware that on the internet you can find some really interesting and well substantiated information, as well as complete crap. Try to be reflective on the quality of the sources you use, avoid the rubbish ones. For this reason, it might be wise not to completely depend on internet sources. Don't be allergic for reading scientific literature - Google Scholar or the TU/e library website might be a good starting point to do so.

All citation in the text of the document should point to an entry in the reference list. But it also works the other way around: all entries in the reference list should be referred to in the text. The reference list should come on a separate page under the heading 'References', after the main text (chapters), but before the appendices. Entries in the reference list should be alphabetized. All entries of the reference list should be traceable. Therefore at least information is included on author(s), title (incl. book or journal title), date and place of publication. This also holds for internet sources. For references to internet pages include the title of the webpage, the organization that is publishing or author, date of publication, date of access, http code. Never refer to a too general site, like http://www.tue.nl. These host that much information that it would be like stating that you went to the library - there is no way that the information you used is traceable.

In the text, use references to your sources by author and year, e.g. (Kirkels, 2012). You do this: when a certain paragraph is based on that source; when you are using data from that source; when you want to use someone's results or arguments (e.g. as Kirkels showed/argued in his 2012 paper…). This way it becomes clear where the information and data you use is coming from.

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[8] Translated from: IJsselsteijn, W.A. (2007), Studeerwijzer HTI Design Track A. TU/e, Faculteit Technologie Management.

[9] See for example the summary offered by TU/e 'APA style'
http://w3.tue.nl/fileadmin/bib/gifs_jpegs/information_skills/references_and_in_text_format_for_APA_style_juni_2014.pdf

If the author(s) names are mentioned in the same sentence, include only the year of publication. If the year of publication is mentioned in the text, include only the author's name in the citation:

- *For works by two authors, always include both author names (Anderson & Bjorn, 2003).*
- *As Anderson and Bjorn (2003) illustrated in their recent study…*
- *As recently as 2003, a prominent study (Anderson & Bjorn) illustrated…*

In the ideal case you 'contextualize' sources: you give an indication of what (or how) the author was doing, and thereby whether his argument or data are relevant or not. See the examples blow. Note the relevance in this context of words like: however; but; contributing to; in line with; contrasting; confirming; challenging; detailing out; some - while others. These words position the different pieces of evidence (and the scholars that reported on it).

- *The data by Shing et al. (2000) relate to village electrification in India. We will be using it for our case on Africa, as we investigate a system of somewhat similar scale.*
  [Note that in this case it raises the question whether starting conditions in India and Africa are the same]
- *Watt (2005) shows convincingly how prosperity relates to energy use. However, Romijn (2007) criticizes this on two grounds: the relation as established by Watt is based on correlation and does not show cause and effect; and many other explanatory factors can be found in literature for both economic growth and for energy use.*
- *Some innovation scholars, like Nerd (2003) and Engineer (2008), emphasize the engineering logic in technological development, while others like Sociologist (2003) and Kletspraat (2014), put more emphasis on agency and a variety of stakeholder influences.*
- *Pietersen (1995) showed general patterns of development for energy systems over the 20th century, based on both literature study and science and technology indicators for diffusion. This made us wonder whether this would also hold for recent local developments of application of PV in the Netherlands.*
  [from general to specific, context has changed (time, aggregation level)]
- *The recent interest in renewables has received ample interest by scholars that contributed by a case study description of renewables like solar PV (Aadje, 2012), off shore wind (Beetje, 2012) and biomass combustion (Ceetje, 2012; Deetje, 2012). However, the question of more general patterns (drivers and barriers) has not yet been addressed.*
  [from specific to more general]
- *The recent interest in renewables has received ample interest by scholars that describe the introduction of renewables like solar PV (Aadje, 2012), off shore wind (Beetje, 2012) and biomass combustion (Ceetje, 2012; Deetje, 2012). But the introduction of micro-hydro has so far not been studied.*
  [broadening scope]

If you are literally using text (from one sentence to a full paragraph), it is a quote: put it in between "double quotation marks", make the text *italic*, and always explicitly refer to source (author, year + page number (p.205). Citing larger bodies of text, or using citations very frequently is considered inappropriate (unless there is a good methodological reason for it…).

Appendix D Final learning outcomes bachelor Sustainable Innovation

On the next page the learning outcomes of the bachelor program Sustainable Innovation are listed.[10] They are linked to the deliverables of the bachelor final project: plan of work, intermediate and final reports, presentation and professional attitude. Below several remarks and clarification are made with respect to different competencies.

Plan of work		Presentation			Competences
					A. Competent in scientific disciplines:
	X		X		A.1. Knowledge of and insight into sustainable innovations
X	X		X		A.2. Knowledge of and insight into specific technological systems and their components in one of the following technology domains: Sustainable Living, Smart Systems and Sustainable Energy.
X	X		X		A.3. Knowledge of and insight into the core concepts, theoretical frameworks and methodologies of the disciplines economics, sociology, engineering relevant for the complex relationships between innovations, sustainability, and society.
X	X		X		A.4. Knowledge of and insight into the relevant observation, data collection and analysis techniques.
					A.5. Knowledge of and insight into the basics of the engineering profession such as mathematics, statistics and programming.
					B. Competent in doing research:
X	X				B.1. Ability to develop a research plan (with supervision).
X	X		X		B.2. Ability (with supervision) to contribute to the development of scientific knowledge in one of the areas of the innovation sciences.
X	X	X			B.3. Ability (with supervision) to identifying and analyzing problems typical for the innovation sciences, by integrating technological and social sciences perspectives.
					C. Competent in designing:
	X		X		C.1. Capability to design policy (processes), governance and/or socio-technical systems with respect to sustainable innovation
		X			C.2. Capability to integrate existing knowledge in such a design.
		X			C.3. Ability to integrate analysis and synthesis from the technological and social sciences domains in such a design
X	X	X			C.4. Understands the importance of other scientific disciplines — such as economy, sociology, law, building and construction engineering, physics, electro-mechanical and information technology — and academics from other cultural backgrounds. In a team, the BSc engineer contributes to solving multi- or interdisciplinary problems.
					D. Scientific approach:
	X		X		D.1. Basic ability to read and write scientific texts.
X	X	X		X	D.2. Ability to reflect, think and behave systematically (with supervision).
X	X	X			D.3. Ability to look beyond the borders of a specific discipline, to be sensitive to the relative contributions of various disciplines and to understand the knowledge demands of a specific discipline.
					E. Intellectual skills:
X	X	X		X	E.1. A reflective attitude.
	X		X		E.2. Basic computer skills and ability to handle complex data.
X	X	X		X	E.3. Critical mindset.

---

[10] As described in the document 'Major Sustainable Innovation', 20 November 2014. In the document the major Sustainable Innovation as part of the BSc in Innovation Science (TIW) is positioned in the Bachelor College, based on the learning outcomes prior accreditation by NVAO (Netherlands-Flemish Accreditation Organization).

<td colspan="5" style="background:red"></td>					E.4. Ability to think in abstract terms.
					F. Competent in co-operating and communicating:
<td colspan="5" style="background:red"></td>					F.1. Capability in communicating with engineers, academics, policy makers and the public at large and in cooperating in a multidisciplinary environment.
<td colspan="5" style="background:red"></td>					F.2. Capability of reporting and communicating problems and solutions, both verbally and in writing, with colleagues, engineers and users of varying educational levels.
					F.3. Ability to work in multidisciplinary teams.
					G. Takes account of the temporal, technological and social context:
<td colspan="5" style="background:red"></td>					G.1. Ability to reflect on the relationship between technological innovations and their relation to users and society and on proposed adaptations and innovation processes.
<td colspan="5" style="background:red"></td>					G.2. Ability to reflect on the impacts of use of scientific knowledge and technology, the implicated normative and ethical issues, and the way in which knowledge and technology development is influenced by it social and historical context.
<td colspan="5" style="background:red"></td>					G.3. Ability to place designs in a historical context and to cope with ethical aspects of design processes.

Appendix E Calibrating grades final report

For grading, the supervisors take into account the status of this project: the bachelor final thesis that should cover the complete research cycle and that has a study load of 280 hours. The grading procedure is similar to how gymnastics is graded. If you choose a simple exercise and do it perfectly you have a maximum score of 7. If you aim for a higher score you need to select a more difficult exercise and work more autonomous. If you choose a difficult exercise you can achieve score above 7 even if your performance was not perfect.

Below we provide some guidelines, to give some idea what makes a good or a bad report. It is not meant to facilitate instrumental assessment of projects. Students tend to do better on some criteria and score lower on others. It is up to the supervisors to come with a final judgment. The grading standards presented below are based on three major criteria for evaluating the final report: originality / difficulty / autonomous working; content / execution; report.

"8.5 - 10" Reports

Originality / difficulty / autonomous working
- The student posed a thoughtful, creative question that engaged him in challenging or provocative research.
- He/she discussed the topic in a fresh and mature manner. The reasoning is valid and supported by an original theoretical or methodological framework. He/she critically addresses theories and develops new insights, e.g. by exploring new causal relationships, improving a theoretical lens, or combining theories/methods in a thoughtful way.
- Student has worked autonomous: set its own course, made decisions, occasionally consulting the first supervisor in a professional way (two way discussion, critical, contribution).

Content / execution
- Discussed the topic effectively, shows substantial insight, evidence is detailed.
- Variety of quality sources that are relevant, balanced and include critical readings. Sources have been used creatively and cited appropriately; documentation is error-free.
- Paper is thoughtful, showing hard work, good judgment, and sensitivity to the complexities.

Report
- The organization is effective for the audience and purpose.
- The Introduction contains time/place setting information, research questions, and the main points that will be discussed.
- Segments, whether sections or paragraphs, are fully developed and follow logically from what precedes them.
- It contains very few grammatical, spelling, punctuation or syntax errors.

"7 - 8" Reports

Originality / difficulty / autonomous working
- Student posed a focused question involving him in challenging research.
- The assignment has not just been followed but fulfilled. Not settled for the most obvious evidence.

Content / execution
- Paper shows a clear sense of audience and purpose. It shows more awareness of the implications of what it is saying and of its assumptions than the "6" report does.
- Variety of relevant sources, used creatively and cited appropriately.
- The "7" report is characterized by thoroughness.
- The reasoning is supported by a theoretical or methodological framework. The reasoning not only makes no mistakes, but also it shows thoughtfulness and awareness of complexities and other points of view.

Report
- The "7-8" report has an effective introduction and conclusion.
- The order of information is logical, and the reader can follow it because of well-chosen transitions.
- Paragraph divisions are logical, and the paragraphs use enough specific detail to make their point tellingly.
- Writing is competent. Hardly serious sentence errors such as comma splices, fragments, or fused sentences in a "7" report. Word choice is idiomatic, vocabulary precise. Punctuation, grammar, and spelling correct.

"6" Reports

Originality / difficulty / autonomous working
- The assignment and the feedback from the supervisor has been followed in straightforward and unimaginative manner.

Content /execution
- The information and degree of persuasion in a "6" report is appropriate. Limited range of sources; displayed minimal effort in selecting quality resources. Documented with some care: sources are cited; few errors noted.
- Theoretical or methodological framework was used to support the line reasoning, but may exhibit imperfections or inconsistencies. No major flaws in its reasoning.

Report
- The Set-up is clear. The reader could easily outline the presentation.
- Paragraphs have adequate development and are divided appropriately.
- The language is competent. Sentence structure and word choice are generally correct though limited. Report is generally free of unintentional fragments, and fused sentences. Errors in spelling and grammar.

"5" Reports (failed project, need for re-examination)

Originality / difficulty / autonomous working
- The assignment and the feedback from the supervisor has been followed in straightforward and unimaginative manner.

Content / execution
- Attempts to follow the assignment, even if the choice of topic or situation is poor, whether too broad, too narrow, or inappropriate.
- Necessary evidence may be missing; irrelevant evidence present; interpretation inadequate. Reasoning maybe seriously flawed, resting on an insufficient understanding of the situation.
- Most sources cited appropriately, but student needs to use greater care in documenting sources. It may rely too heavily on evidence from published sources without adding original analysis.

Report
- Relevant segments may be missing. Topic sentences may be absent or inappropriate to the content of the paragraph. Paragraphs are not well developed, divided or arranged. Transitions are missing or incorrect. Introductions or conclusions are missing or incomplete.
- A "5" report may have numerous and consistent errors in grammar, spelling, and punctuation. Syntax or diction in some sentences may be so flawed that they are incomprehensible.
- Lack of proofreading can turn an otherwise adequate report into a "5" report.

⇨ A '5' report needs rewriting and some addition analysis. A committed student should be able to follow up on feedback and come up with a revised version within 3 weeks.

"4" Reports (failed project, need for re-examination)

Originality / difficulty / autonomous working
- The assignment and the feedback from the supervisor has been followed in straightforward and unimaginative manner.

Content / execution
- The "4" report may have not answered the assignment topic, even if it is correctly and coherently written.
- The Conclusion does not deal with the thesis or does not answer to the main questions. It relates to the assignment but has no clear purpose, or goes off in several directions. The main conclusions are not supported by the sources and argumentation in the former sections.
- Student gathered information that lacked relevance, quality, depth and balance.
- The reasoning is not supported by any theoretical or methodological framework.

- Missing essential elements of report or appearing in wrong section. Much too long or much too short.
- Plagued by deficiencies. Numerous and consistent errors of grammar, spelling, punctuation, etc. seriously hinder communication.

⇨ A '4' report needs serious rewriting and addition analysis. In addition, the lack of structure of the research/report seriously hinders its improvement.

Appendix F Declaration TU/e Code of Scientific Conduct for the bachelor's final project

I have read the TU/e Code of Scientific Conduct.

I hereby declare that my bachelor's final project has been carried out in accordance with the rules of the TU/e Code of Scientific Conduct

Date

……………………………………………………………………………………………..…………..

Name

……………………………………………………………………………………………..…………..

Id-nr

……………………………………………………………………………………………..…………..

Signature

……………………………………………………………………………………………..…………..

<mark>Fill in this form. A scan of this form has to be posted on Canvas.</mark>

i See: http://www.tue.nl/en/university/about-the-university/integrity/scientific-integrity/
The Netherlands Code of Conduct for Academic Practice of the VSNU can be found here
also. More information about scientific integrity is published on the websites of TU/e and
VSNU July 2 2015

Appendix G BEP Interim Form

BACHELOR SUSTAINABLE INNOVATION
BACHELOR END PROJECT (BEP) INTERMEDIATE EVALUATION FORM
DEPARTMENT OF INDUSTRIAL ENGINEERING AND INNOVATION SCIENCES

Student Information

Student Name:

ID-Number:

Title Project:

TU/e Supervisor Name:

Professional Skills:
if applicable

Planning and Organizing:

Writing:

Professional Attitude:

Grade Intermediate Report
(=20% of final grade; expressed in 0.1 grades)

The grade field and the professional skill fields are automatically synced.

Signature First Supervisor

For the best performance, fill and save the form in Adobe Acrobat (Reader). Saving before filling via another reader might corrupt the fields.

1

USER MANUAL OF THE BEP RUBRIC

Ideally, the bachelor end project (BEP) should demonstrate that a student has achieved all the learning goals of Sustainable Innovation (SI) bachelor programme at a sufficient level before awarding the diploma. This way the quality of the student and the value of the SI bachelor diploma can be guaranteed. However, the learning outcomes of the SI programme are phrased in terms of ACQA competences, whereas main deliverable is the bachelor thesis, which should meet scientific standards. This rubric for the bachelor end project (BEP) thesis is designed to make the relation between the two as explicit and transparent as possible.

The rubric is designed with the following goals in mind:

- The rubric makes sure that all learning outcomes are represented in the form of ACQA competences, while still being as concise as possible.
- In addition, the relation between the actual deliverables of the BEP is made explicit by listing the features of the bachelor thesis, the writing skills and process that can be used to assess a given competence (first column).
- By making the criteria for grading explicit, the assessments from different teachers should be more homogeneous and counteract different practices. It should be easier to assess a given bachelor thesis. Given that there is a wide variety between research topics of the BEP, the criteria for excellence should NOT be read as an exhaustive list, but as guidelines for interpreting the more abstract competences.
- The rubric is a formative feedback instrument that teachers can use to give feedback about the performance of the student. Each competence can be rated from Failed, via Insufficient to Excellent.
- The comment boxes are crucial for explaining why a certain competence was rated high or low. Providing comments is therefore mandatory.
- The rubric can also be used as a summative grading instrument. Both the first supervisor and second assessor can assign partial grades.
- The rubric for the intermediate report is used in an extended form for the assessment of the final report.

Usage:

- First supervisor assesses report/project and completes the form.
- First supervisor keeps the form for own administration. The intermediate form does not need to be sent to the CSA IEIS. The grade of the intermediate report will also be on the final assessment form

2

A. Quality Problem Identification and Theoretical Framework

	1-4	5	6	7	8	9-10
Research problem, research aim and question, scientific and societal relevance	The research problem does not concern a socio-technical issue and is not related to sustainability/ sustainable innovation. There is no or poor description of the research problem leading to a clear problem statement. There is no relation to the research question/ aim or the literature, does not match the problem, relevance of the research is not clear.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. Limited description of the research problem. There is no relation to the research question/ aim or the literature does not match the problem, relevance of the research is not clear.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a broad research problem and it is connected with relevant literature to the research question/aim. The relevance of the research is described.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear research problem and it is connected to the research question/aim. The relevance of the research is described. Gap in the literature is identified.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear and concise research problem which is clearly connected to the research question/ aim; the relevance of the research is substantiated. Scope and boundaries of the research are well defined.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear, concise and original research problem which is clearly connected to the research question/aim. The student substantiates the scientific and societal relevance of the research. Scope and boundaries of the research are well defined (boundaries).
	☐	☐	☐	☐	☐	☐

THE ASSESSMENT FORMS CAN BE FOUND ON CANVAS UNDER MODULES.
PLEASE DOWNLOAD THE FORMS THERE FOR USAGE.

3

BACHELOR END PROJECT (BEP) INTERMEDIATE EVALUATION FORM

DEPARTMENT OF INDUSTRIAL ENGINNERING & INNOVATION SCIENCES

A. Quality Problem Identification and Theoretical Framework

	1-4	5	6	7	8	9-10
Description of relevant literature	A review of the relevant literature is missing, incomplete or unclear.	Review of the relevant literature is incomplete or unclear.	The relevant literature is described	The relevant literature is described, connected to the research aim	Thesis contains critical review of relevant literature, connected to the research aim.	Thesis contains crititcal review of relevant literature and connects to ongoing debates and the reserach aim.
	☐	☐	☐	☐	☐	☐
Relevant theories and key concepts	Role of theory is not clear. Literature used is (partly) irrelevant and/or insufficient to answer the research question. And/or, theoretical concepts are misunderstood.	Role of theory is insufficiently clear. Literature is only partially relevant. And/ or, theoretical concepts are misunderstood	The main theoretical concepts and their relations are clearly defined and linked to the research question/ aim and literatures. Theoretical concepts are understood and application is sufficient	The main theoretical concepts and their relations are clearly defined and linked to the research question/ aim and literatures. Theoretical concepts are understood and application is sufficent to good.	The research question/ aim is reformulated in theoretical terms. The main theoretical concepts and their relations are clearly defined and connected to literatures. Theoretical concepts are understood and application is good.	The research question/ aim is reformulated in theoretical terms. The main theoretical concepts and their relations are clearly defined and connected to relavent literatures and theoretical debates. Theoretical concepts are understood and application is excellent / original.
	☐	☐	☐	☐	☐	☐
Grade Part A	Explanation (obligatory)					

4

42

B. Quality of Research Methods

Scientific approach	1-4	5	6	7	8	9-10
	The chosen research method(s) do not correspond (well) to the problem statement. No structured description (reproducible steps) of the research method.	Most of the chosen research method(s) and instruments do not correspond well to the problem statement. No structured description (reproducible steps) of the research method.	The research approach is mostly adequate (one or more suitable research methods) corresponding to the problem statement. The steps of the research method are listed.	The research approach is adequate. The chosen research method(s) and instruments correspond to the problem statement and are based on literature. Steps of research method are listed and basically explained. Validity of research approach is discussed. Researcher shows sufficient scientific attitude (applying (inter) discplinary literatures, concepts and methodes)	The research approach is adequate. The chosen research method(s) and instruments correspond to the problem statement and are based on literature. The chosen research approach is justified by the student. Steps of research method are listed and explained in detail. Validity of research approach is critically discussed. Researcher shows good scientific attitude (applying (inter) discplinary literatures, concepts and methodes)	The research approach is adequate and thoroughly considered. Choices are clearly justified from the perspective of the problem statement and literature. The research approach stands out because of originality and/or complexity. Steps of the research method are listed and explained in detail. Validity of research approach is critically discussed. Researcher has an excellent scientific attitude (applying (inter)disciplinary literatures, concepts and methodes)
	☐	☐	☐	☐	☐	☐

Grade Part B	Explanation (obligatory)

5

C. Expected Quality of Research Execution

	1-4	5	6	7	8	9-10
Data Collection and Data Management	The student does not know what kind of data he/she will collect and did not start to collect any data.	The student did not start to collect any data. Or the student did begin to collect data, but we fear that the final collection of data will be too limited, and there is no faith in the validity and reliability of the data.	The student did start to collect data, but we fear that the final collection of data will be limited, or there is limited faith in the validity and reliability of the data and its processing.	The student did start to collect data. We expect that the final collection of data will be sufficient, and there is faith in the validity and reliability of the data and its processing.	The student already collected data. We expect that the final collection of data will be sufficient. There is also enough faith in the validity and reliability of the data and its processing.	The student already collected a substantial amount of data. We expect that the final data collection will be significant. There is also more enough faith in the validity and reliability of the data and its processing

☐ ☐ ☐ ☐ ☐ ☐

Grade Part C	Explanation (obligatory)

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6

D. Skills -so far

Planning and Organizing -so far

	POOR	SUFFICIENT	GOOD
Planning and organizing the research	Despite all guidance, is the student not able to organize the research. The planning is without any detail (only phasing), not feasible and/or back-up strategies are lacking. Unnecessary work is done due to bad or unchanged planning. Urgencies and importance of aspects is not recognized (despite the supervisor repeatedly addressed them).	Needs some guidance to organize the research project according to the planning. The planning is somewhat concrete (contains phases and milestones) and feasible. Back-up strategies are sufficiently thought out. Plan adapted with help of the supervisor. Urgencies and importance of aspects is not always recognized. The supervisor needs to address some priorities.	Individually organizes and manages the research project according to the (adapted) planning and undertakes action if needed (own initiative, in good cooperation). The planning is concrete (contains milestones and specifications of all activities for each of the phases of the research) and feasible. Updates during the project are processed clearly, back-up strategies are very well thought out. Urgencies and importance of aspects are recognized, priorities are set.
	☐	☐	☐

Grade PRV Planning (PO, SUF, GO)	Explanation (obligatory)

THE ASSESSMENT FORMS CAN BE FOUND
ON CANVAS UNDER MODULES.
PLEASE DOWNLOAD THE FORMS THERE FOR USAGE.

7

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D. Skills -so far

Writing Skills -so far

	POOR	SUFFICIENT	GOOD
Quality of the message / Line of reasoning	No line of reasoning or rudimentary argumentative structure. Ideas are unconnected. Claims are repeated rather than developed. Few objections are addressed and maybe misrepresented. Claims are not or rarely supported by reliable evidence from credible sources, making the report unconvincing.	Argumentative structure is evident and satisfactory. Objections are taken seriously and typically addressed fair-minded. Claims are regularly supported by valid, reliable evidence from credible sources, making the report for the most part convincing.	Reader can easily follow the line of reasoning. Argumentative structure is clearly evident. Objections are taken seriously and addressed in a fair-minded way with great skill. Claims are supported by reliable, valid evidence from credible sources and effectively synthesized in a very convincing manner.
	☐	☐	☐
Structure	The report is badly structured. Main structure is incorrect and/or placement of material in different chapters is illogical in many places. Chapters are separate entities and are not connected to each other. Level of detail varies widely (information missing, or irrelevant information is given).	The main structure is correct, but lower level hierarchy of sections is not always logical in places. Most sections have a clear and unique function. The connection of parts could be improved. Level of detail is inappropriate in a number of places (irrelevant information is given).	Well-structured: each section has a clear and unique function. Hierarchy of sections is correct. Ordering of sections is logical. Parts of the paper connect well to each other. All information occurs at the correct place. Level of detail is appropriate throughout the report.
	☐	☐	☐
Readability	The report is characterized by bad readability and academic writing style. Formulations in the text are often incorrect. Vagueness and/or inexactness in wording occurs regularly inhibiting a correct interpretation of the text. Unbalanced use of text, (not useful) graphs, tables, graphs or graphics and appendices in many places.	The report is properly readable. An academic style of writing is used. Formulations in the text are predominantly clear and exact. The paper could have been written more concisely. Appropriate use of text, tables, graphs and graphics and appendices.	The report is characterized by a very good and professional style of writing. Academic conventions with regard to style of writing, lay-out and finishing are followed meticulously. Clever use of text, tables, graphs and graphics and appendices, enhancing understanding and adding interest.
	☐	☐	☐

8

46

D. Skills -so far

Writing Skills -so far

	POOR	SUFFICIENT	GOOD
Grammar/spelling	Grammar (word order, verb tenses) vocabulary (correct choice of words, no repetitive words) and textual mechanics (spelling, punctuation, capitalization) errors so numerous that they make the paper almost impossible to understand (seriously distract the reader and impede meaning). English incorrect and very hard to read.	Grammar, vocabulary and/or textual mechanical errors present, but at acceptable quantities and not seriously impeding the reader. English basically correct and readable.	Excellent grammar, vocabulary and textual mechanics (very few or no errors). English fluent and pleasant to read.
	☐	☐	☐
Referencing	The student is often inconsistent in references in the text and/or reference list, or often references are lacking.	The student is sometimes inconsistent in references in the text and/or reference list, or a few times references are lacking.	The student uses one format for references in the text and the reference list. The reference list is complete. There are no mistakes.
	☐	☐	☐
Layout	The title page and/or table of content are lacking or incomplete. Headings are missing, inconsistent or unclear. Tables and figures are incomplete.	The title page and table of content are incomplete. Headings are inconsistent or unclear. Tables and figures are incomplete.	A title page, table of content, clear and consistent headings and complete tables and figures are included.
	☐	☐	☐
Tailored to target group (academic layman level)	The report is not tailored to the target group (academic layman level).	Parts of the report are not tailored to the target group (academic layman level).	The report is tailored to the target group (academic layman level).
	☐	☐	☐

Grade PRV Writing Skills (PO, SUF, GO)	Explanation (obligatory)

9

D. Skills -so far

Professional Attitude -so far

	POOR	SUFFICIENT	GOOD
Self-dependence	The student needed help and support to proceed in the project; did not contribute own ideas.	The student worked to a large extent independently or took initiative to receive help; needed some feedback to develop ideas.	The student worked independently; used own ideas; showed initiative
	☐	☐	☐
Attitude in communication and cooperation	The student is rude and/or defensive or is working in isolation.	The student seeks for contact when needed but is sometimes still looking for an appropriate way.	The student is respectful and constructive in communication and cooperation.
	☐	☐	☐
Followed agreements/ rules and showed up for appointments	The student's behavior is messy regarding agreements; forgets meetings or is unprepared.	The student largely follows agreements and showed up for appointments; preparation may vary.	The student followed agreements/rules and showed up for appointments; was well-prepared.
	☐	☐	☐
Critical reflective attitude	The student is not able to improve own work based on systematic critical reflection; does not incorporate (supervisor's) feedback.	The student needs some help to reflect, think and behave systematically; incorporated most of (supervisor's) feedback.	The student has a critical reflective attitude; reflects, thinks and behaves systematically; incorporated (supervisor's) feedback.
	☐	☐	☐

Grade PRV Proffesional Attitude (PO, SUF, GO)	Explanation (obligatory)

10

Finalisation

Final Comments

Grade Intermediate Report*

THE ASSESSMENT FORMS CAN BE FOUND ON CANVAS UNDER MODULES. PLEASE DOWNLOAD THE FORMS THERE FOR USAGE.

First supervisor keeps the form for own administration. This intermediate form does not need to be sent to the CSA / EIS. The grade of the intermediate report will also be on the final assessment form

* Please fill in the grade of the intermediate report manually. This grade is based on the grades of block A, B and C, taking into account the phase of the project. This grade is not necessarily a calculated average of the grades of block A, B and C. Add final comments to clarify possible differences.

Note: Grade Intermediate Report counts for 20% of the final grade, expressed in 0.1 grades.

Find the signature field on the first page.

This is the end of the Bachelor's End Project (BEP) Intermediate Evaluation Form.

11

Appendix H BEP Final Form 1st Supervisor

TU/e

BACHELOR SUSTAINABLE INNOVATION
BACHELOR END PROJECT (BEP) FINAL EVALUATION FORM
DEPARTMENT OF INDUSTRIAL ENGINEERING AND INNOVATION SCIENCES

Student Information

Student Name: _____ FINAL GRADE

ID-Number: _____

Title Project: _____

TU/e Supervisor Name: _____ *in 0.5 grades*

Second Assessor:

Internship PhD: *if relevant*

The grade fields and the professional skill fields are automatically synced with the grades on pages. Please find the signature and comments part on the last page.

Professional Skills: Planning and Organizing:
if applicable
                              Writing:

                        Professional Attitude:

Signatures
Only sign the form when it is complete. Do not make any further changes after signing.

_____
Signature First Supervisor

For the best performance, fill and save the form in Adobe Acrobat (Reader). Saving via another reader might corrupt the fields.

1

50

USER MANUAL OF THE BEP RUBRIC

Ideally, the bachelor end project (BEP) should demonstrate that a student has achieved all the learning goals of Sustainable Innovation (SI) bachelor programme at a sufficient level before awarding the diploma. This way the quality of the student and the value of the SI bachelor diploma can be guaranteed. However, the learning outcomes of the SI programme are phrased in terms of ACQA competences, whereas main deliverable is the bachelor thesis, which should meet scientific standards. This rubric for the bachelor end project (BEP) thesis is designed to make the relation between the two as explicit and transparent as possible.

The rubric is designed with the following goals in mind:

- The rubric makes sure that all learning outcomes are represented in the form of ACQA competences, while still being as concise as possible.
- In addition, the relation between the actual deliverables of the BEP is made explicit by listing the features of the bachelor thesis, the writing skills and process that can be used to assess a given competence (first column).
- By making the criteria for grading explicit, the assessments from different teachers should be more homogeneous and counteract different practices. It should be easier to assess a given bachelor thesis. Given that there is a wide variety between research topics of the BEP, the criteria for excellence should NOT be read as an exhaustive list, but as guidelines for interpreting the more abstract competences.
- The rubric is a formative feedback instrument that teachers can use to give feedback about the performance of the student. Each competence can be rated from Failed, via Insufficient to Excellent.
- The comment boxes are crucial for explaining why a certain competence was rated high or low. Providing comments is therefore mandatory.
- The rubric can also be used as a summative grading instrument. Both the first supervisor and second assessor can assign partial grades.
- The rubric for the intermediate report is used in an extended form for the assessment of the final report.

Usage:

- This form (final form) is only filled in by the first supervisor.
- The second supervisor assesses the report by means of the form for the second supervisor (different form) whereafter he/she sends the form to the first supervisor.
- The first supervisor fills the grade of the second supervisor in the box of page 13 (mandatory field). In case the assessment between the first and second supervisor were different, an explanation is provided on page 13.
- The first supervisor emails both of the forms to the CSA IEIS (CSA.IEIS@tue.nl)

2

51

A. Quality Problem Identification and Theoretical Framework

	1-4	5	6	7	8	9-10
Research problem, research aim and question, scientific and societal relevance	The research problem does not concern a socio-technical issue and is not related to sustainability/ sustainable innovation. There is no or poor description of the research problem leading to a clear problem statement. There is no relation to the research question/ aim or the literature does not match the problem, relevance of the research is not clear.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. Limited description of the research problem. There is no relation to the research question/ aim or the literature does not match the problem, relevance of the research is not clear.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a broad research problem and it is connected with relevant literature to the research question/aim. The relevance of the research is described.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear research problem and it is connected to the research question/aim. The relevance of the research is described. Gap in the literature is identified.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear and concise research problem which is clearly connected to the research question/ aim; the relevance of the research is substantiated. Scope and boundaries of the research are well defined.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear, concise and original research problem which is clearly connected to the research question/aim. The student substantiates the scientific and societal relevance of the research. Scope and boundaries of the research are well defined (boundaries).
	☐	☐	☐	☐	☐	☐

3

A. Quality Problem Identification and Theoretical Framework

	1-4	5	6	7	8	9-10
Description of relevant literature	A review of the relevant literature is missing, incomplete or unclear.	Review of the relevant literature is incomplete or unclear.	The relevant literature is described	The relevant literature is described, connected to the research aim	Thesis contains critical review of relevant literature, connected to the research aim.	Thesis contains crititcal review of relevant literature and connects to ongoing debates and the reserach aim.
	☐	☐	☐	☐	☐	☐
Relevant theories and key concepts	Role of theory is not clear. Literature used is (partly) irrelevant and/or insufficient to answer the research question. And/or, theoretical concepts are misunderstood	Role of theory is insufficiently clear. Literature is only partially relevant. And/ or, theoretical concepts are misunderstood	The main theoretical concepts and their relations are clearly defined and linked to the research question/ aim and literatures. Theoretical concepts are understood and application is sufficient	The main theoretical concepts and their relations are clearly defined and linked to the research question/ aim and literatures. Theoretical concepts are understood and application is sufficent to good.	The research question/ aim is reformulated in theoretical terms. The main theoretical concepts and their relations are clearly defined and connected to literatures. Theoretical concepts are understood and application is good	The research question/ aim is reformulated in theoretical terms. The main theoretical concepts and their relations are clearly defined and connected to relavent literatures and theoretical debates. Theoretical concepts are understood and application is excellent / original.
	☐	☐	☐	☐	☐	☐

Grade Part A	Explanation (obligatory)

4

53

B. Quality of Research Methods

	1-4	5	6	7	8	9-10
Scientific approach	The chosen research method(s) do not correspond (well) to the problem statement. No structured description (reproducible steps) of the research method.	Most of the chosen research method(s) and instruments do not correspond well to the problem statement. No structured description (reproducible steps) of the research method.	The research approach is mostly adequate (one or more suitable research methods) corresponding to the problem statement. The steps of the research method are listed.	The research approach is adequate. The chosen research method(s) and instruments correspond to the problem statement and are based on literature. Steps of research method are listed and basically explained. Validity of research approach is discussed. Researcher shows sufficient scientific attitude (applying (inter)discplinary literatures, concepts and methodes)	The research approach is adequate. The chosen research method(s) and instruments correspond to the problem statement and are based on literature. The chosen research approach is justified by the student. Steps of research method are listed and explained in detail. Validity of research approach is critically discussed. Researcher shows good scientific attitude (applying (inter) discplinary literatures, concepts and methodes)	The research approach is adequate and thoroughly considered. Choices are clearly justified from the perspective of the problem statement and literature. The research approach stands out because of originality and/or complexity. Steps of the research method are listed and explained in detail. Validity of research approach is critically discussed. Researcher has an excellent scientific attitude (applying (inter)disciplinary literatures, concepts and methodes)
	☐	☐	☐	☐	☐	☐

Grade Part B	Explanation (obligatory)

5

C. Quality of Research Execution

	1-4	5	6	7	8	9-10
Data Collection and Data Management	The student was not able to collect data and/or process data or the collection of data is too limited.	The collection of data is too limited and/or there are doubts about the validity and reliability of the data, prompted by the unclear or incorrect way in which the student acquired and/or processed the data (not transparent)	The collection of data is sufficient. There is sufficient faith in the validity and reliability of the data and its processing (most times transparent)	The collection of data is sufficient. There is sufficient faith in the validity and reliability of the data and its processing (most times transparent)	The collection of data is substantial. There is faith in the validity and reliability of the data and its processing (transparent), based on an adequate justification.	Extensive data collection. The acquisition of the data took place in an adequate fashion. The way in which the data have been processed has been meticulously documented and justified.
	☐	☐	☐	☐	☐	☐
Data analysis and results	No or limited analysis and/or interpretation. Claims cannot be checked. There is no or limited description of the research results or the presented results do not logically follow from analysis.	Results follow broadly from analysis but without interpretation	Correct analysis. Results follow from analysis. Analysis and interpretation are superficial	Correct analysis. Results follow logically from analysis. Results are presented clearly and organized, factual and with interpretations.	Correct and thorough analyses of the data. Results follow logically from analysis. The results are presented clear and well organized, factual and with interpretations. and presented in relation with research questions.	Advanced and original analyses of the data. The results follow logically from analysis. The results are presented are clear, very well- organized (emphasizing the essence of the research) and factual. The meaning of the results is described and explained in detail. Tables and figures are well integrated in the line of argumentation. Critical reflection on results and the relation between concepts.
	☐	☐	☐	☐	☐	☐

Grade Part C	Explanation (obligatory)

6

D. Quality of The Conclusion and Discussion

	1-4	5	6	7	8	9-10
Conclusions and implications	No or (very) weak conclusions. Not based on data analysis and not linked to the research questions. Or conclusions are drawn providing only partial answers to the research question, repeat results or are not substantiated by results or relevant literature.	Some conclusions are drawn providing only partial answers to the research question. Conclusions merely repeat results or conclusions are not substantiated by results or relevant literature.	Conclusions are based on analysis and linked to the research questions. The research questions are answered.	Conclusions are based on analysis, linked to the research questions, and substantiated by results and relevant literature.	Conclusions are based on analysis, clearly linked to the research questions, and well substantiated by results and relevant literature. Conclusions are formulated exactly. Scientific relevance is addressed. Strategic and/or policy implicatons are formulated.	Conclusions are based on analysis and clearly linked to the research questions. Conclusions very well substantiated by results and relevant literature on a higher level. Results are positioned in broader debates in innovation studies literature. Conclusions are formulated exactly and concise, grouped in a logical way. Identifies the scientific contribution of the research as wel as strategic and/or policy implications.
	☐	☐	☐	☐	☐	☐
Recommendations	No or unsupported recommendations.	Recommendations are too limited and/or the presented recommendations do not logically follow from results.	Recommendations are sufficient, but are superficial. Recommendations follow from results.	Recommendations are clear and follow logically from results. Recommendations are superficailly linked to the scientific debates in innovation studies literature or to the strategic and/or policy implications mentioned in the conclusion.	Clear, well-formulated, and advanced recommendations. Recommendations follow logically from results. Recommendations are linked to the scientific debates in innovation studies literature or to the strategic and/or policy implications mentioned in the conclusion.	Recommendations are well-formulated, advanced and original recommendations follow logically from results. Recommendations are linked to the scientific debates in innovation studies literature and to the strategic and/or policy implications mentioned in the conclusion.
	☐	☐	☐	☐	☐	☐

7

56

D. Quality of The Conclusion and Discussion

	1-4	5	6	7	8	9-10
Critical reflection on the research performed	No critical reflection on the research. Reflection only touches trivial or very general points of criticism. Or student identifies only some possible strengths and weaknesses and/or points at strengths and weaknesses which are in reality irrelevant or non-existent	Student identifies only some possible strengths and weaknesses and/or points at strengths and weaknesses which are in reality irrelevant or non-existent	Student indicates main strengths and weaknesses in the research.	Student indicates main strengths and weaknesses in the research and is able to weigh their impact on the main results relative to each other.	Student indicates all strengths and weaknesses in the research and weighs them relative to each other. Furthermore, (better) alternatives for the research methods used are indicated. The student reflects on how technical and social science knowledge integration contribute to results.	Student is not only able to identify all possible strengths and weaknesses in the research, but is also able to indicate which strengths and weaknesses affect the conclusions the most. Student indicates all strengths and weaknesses in the research and weighs them relative to each other. Furthermore, (better) alternatives for the research methods used and suggestions for future research are indicated. The student reflects on how technical and social science knowledge integration contributed to results.
	☐	☑	☐	☐	☐	☐

Grade Part D	Explanation (obligatory)

Proceed to the next page.

8

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E. Skills

Planning

	POOR	SUFFICIENT	GOOD
Planning Of Whole BEP Project	Despite all guidance, is the student not able to organize the research. The planning is without any detail (only phasing), not feasible and/or back-up strategies are lacking. Unnecessary work is done due to bad or unchanged planning. Urgencies and importance of aspects is not recognized (despite the supervisor repeatedly addressed them).	Needs some guidance to organize the research project according to the planning. The planning is somewhat concrete (contains phases and milestones) and feasible. Back-up strategies are sufficiently thought out. Plan adapted with help of the supervisor. Urgencies and importance of aspects is not always recognized. The supervisor needs to address some priorities. Individually organizes and manages the research project according to the (adapted) planning and undertakes action if needed (own initiative, in good cooperation).	The planning is concrete (contains milestones and specifications of all activities for each of the phases of the research) and feasible. Updates during the project are processed clearly, back-up strategies are very well thought out. Urgencies and importance of aspects are recognized, priorities are set.
	☐	☐	☐
Planning Of Data Collection	Despite the guidance, the student was not able to plan the data collection adequately. As a result, the amount of collected data was minimal.	The planning of the data collection was adequate. The student collected the needed data within the available timeframe.	The planning of the data collection was above average. The student collected a substantial amount of data within the available timeframe.
	☐	☐	☐
Planning Of Writing Process	Despite all guidance, the student was not able to organize the writing process. The student was not able to hand in his intermediate and/or final report in time	The student needed some guidance to plan the writing process. The planning of the writing process was somewhat concrete (contains phases and specifications of most writing activities) and feasible. The student did hand in the intermediate and final report on time.	The planning of the writing process is concrete (contains milestones and specifications of all writing activities) and feasible. The student did hand in the kept the intermediate and final report on time.
	☐	☐	☐

9

E. Skills	
Planning	
Grade PRV Planning (PO, SUF, GO)	Explanation (obligatory)

THE ASSESSMENT FORMS CAN BE FOUND ON CANVAS UNDER MODULES.

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10

E. Skills

Writing Skills

	POOR	SUFFICIENT	GOOD
Quality of Message & Readability & Structure	No line of reasoning or rudimentary argumentative structure. Ideas are unconnected. Claims are repeated rather than developed. Few objections are addressed and maybe misrepresented. Claims are not or rarely supported by reliable evidence from credible sources, making the report unconvincing.	Argumentative structure is evident and satisfactory. Objections are taken seriously and typically addressed fair-minded. Claims are regularly supported by valid, reliable evidence from credible sources, making the report for the most part convincing.	Reader can easily follow the line of reasoning. Argumentative structure is clearly evident. Objections are taken seriously and addressed in a fair-minded way with great skill. Claims are supported by reliable, valid evidence from credible sources and effectively synthesized in a very convincing manner.
	☐	☐	☐
Structure	The report is badly structured. Main structure is incorrect and/or placement of material in different chapters is illogical in many places. Chapters are separate entities and are not connected to each other. Level of detail varies widely (information missing, or irrelevant information is given).	The main structure is correct, but lower level hierarchy of sections is not always logical in places. Most sections have a clear and unique function. The connection of parts could be improved. Level of detail is inappropriate in a number of places (irrelevant information is given).	Well-structured: each section has a clear and unique function. Hierarchy of sections is correct. Ordering of sections is logical. Parts of the paper connect well to each other. All information occurs at the correct place. Level of detail is appropriate throughout the report.
	☐	☐	☐
Grammar/spelling	Grammar (word order, verb tenses) vocabulary (correct choice of words, no repetitive words) and textual mechanics (spelling, punctuation, capitalization) errors so numerous that they make the paper almost impossible to understand (seriously distract the reader and impede meaning). English incorrect and very hard to read.	Grammar, vocabulary and/or textual mechanical errors present, but at acceptable quantities and not seriously impeding the reader. English basically correct and readable.	Excellent grammar, vocabulary and textual mechanics (very few or no errors). English fluent and pleasant to read.
	☐	☐	☐

11

60

E. Skills

Writing Skills

	POOR	SUFFICIENT	GOOD
Referencing	The student is often inconsistent in references in the text and/or reference list, or often references are lacking.	The student is sometimes inconsistent in references in the text and/or reference list, or a few times references are lacking.	The student uses one format for references in the text and the reference list. The reference list is complete. There are no mistakes.
	☐	☐	☐
Layout	The title page and/or table of content are lacking or incomplete. Headings are missing, inconsistent or unclear. Tables and figures are incomplete.	The title page and table of content are incomplete. Headings are inconsistent or unclear. Tables and figures are incomplete.	A title page, table of content, clear and consistent headings and complete tables and figures are included.
	☐	☐	☐

Grade PRV Writing Skills (PO, SUF, GO)	Explanation (obligatory)

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12

E. Skills

Professional Attitude

	POOR	SUFFICIENT	GOOD
Self-dependence	The student needed help and support to proceed in the project; did not contribute own ideas.	The student worked to a large extent independently or took initiative to receive help; needed some feedback to develop ideas.	The student worked independently; used own ideas; showed initiative
	☐	☐	☐
Communication, cooperation, agreements and appointments	The student is rude and/or defensive, works in isolation and is unprepared for meetings.	The student seeks for contact when needed but is sometimes still looking for an appropriate way. The preparations for meetings may vary.	The student is respectful and constructive in communication and cooperation. The student shows up well prepared for meetings.
	☐	☐	☐
Critical reflective attitude	The student is not able to improve own work based on systematic critical reflection; does not incorporate (supervisor's) feedback.	The student needs some help to reflect, think and behave systematically; incorporated most of (supervisor's) feedback.	The student has a critical reflective attitude; reflects, thinks and behaves systematically; incorporated (supervisor's) feedback.
	☐	☐	☐

Grade PRV Proffesional Attitude (PO, SUF, GO)	Explanation (obligatory)

13

Finalisation

Final Comments

Assessment of First supervisor and Second assessor are largely the same	Assessment of First supervisor and Second assessor were different for Block ... (A/B/C/D); explain your decision	Assessment of First supervisor and Second assessor were different; a Third assessor has been consulted; add the extra Form
☐	☐	☐

Explanation

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Grades

Grade Type	Grade Awarded	Notes and Details
Grade Intermediate Report		20% weight Expressed in 0.1 grades
Grade Final Report		80% weight Expressed in 0.1 grades
FINAL GRADE		Expressed in half grades

The Second Assessor awarded the final report a .

The above field is mandatory; fill in the final report grade of the second assessor.

* Please fill in the grade of the final report manually. This grade is based on the grades of block A, B, C and D, taking into account the phase of the project. This grade is not necessarily a calculated average of the grades of block A, B, C and D. Add Final comments to clarify possible differences.

When completed, add your signature (1st page) and e-mail to CSA.IEIS@tue.nl, the BEP coordinator and the student.

14

Appendix I BEP Final Form 2nd Supervisor

BACHELOR SUSTAINABLE INNOVATION
BACHELOR END PROJECT (BEP) FINAL EVALUATION FORM
DEPARTMENT OF INDUSTRIAL ENGINEERING AND INNOVATION SCIENCES

Second
Assessor Form

Student Information

Student Name:

ID-Number:

Title Project:

TU/e Supervisor Name:

Second Assessor:

Internship PhD: *if relevant*

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Final Report Grade:
in 0.1 grades

Signatures
Only sign the form when it is complete. Do not make any further changes after signing.

_____
Signature Second Assessor

For the best performance, fill and save the form in Adobe Acrobat (Reader). Saving before filling via another reader might corrupt the fields.

1

USER MANUAL OF THE BEP RUBRIC

Ideally, the bachelor end project (BEP) should demonstrate that a student has achieved all the learning goals of Sustainable Innovation (SI) bachelor programme at a sufficient level before awarding the diploma. This way the quality of the student and the value of the SI bachelor diploma can be guaranteed. However, the learning outcomes of the SI programme are phrased in terms of ACQA competences, whereas main deliverable is the bachelor thesis, which should meet scientific standards. This rubric for the bachelor end project (BEP) thesis is designed to make the relation between the two as explicit and transparent as possible.

The rubric is designed with the following goals in mind:
- The rubric makes sure that all learning outcomes are represented in the form of ACQA competences, while still being as concise as possible.
- In addition, the relation between the actual deliverables of the BEP is made explicit by listing the features of the bachelor thesis, the writing skills and process that can be used to assess a given competence (first column).
- By making the criteria for grading explicit, the assessments from different teachers should be more homogeneous and counteract different practices. It should be easier to assess a given bachelor thesis. Given that there is a wide variety between research topics of the BEP, the criteria for excellence should NOT be read as an exhaustive list, but as guidelines for interpreting the more abstract competences.
- The rubric is a formative feedback instrument that teachers can use to give feedback about the performance of the student. Each competence can be rated from Failed, via Insufficient to Excellent.
- The comment boxes are crucial for explaining why a certain competence was rated high or low. Providing comments is therefore mandatory.
- The rubric can also be used as a summative grading instrument. Both the first supervisor and second assessor can assign partial grades.
- The rubric for the intermediate report is used in an extended form for the assessment of the final report.

Usage:
- Second supervisor assesses report/project by means of the form for the second supervisor (this form).
- First supervisor assesses report/project by means of the form for the first supervisor (not this form).
- Second supervisor sends the assessment form (this form) to the first supervisor.
- First supervisor completes the form of the first supervisor and sends both forms to the CSA IEIS (CSA.IEIS@tue.nl).

For the best performance, fill and save the form in Adobe Acrobat (Reader). Saving before filling via another reader might corrupt the fields.

2

A. Quality Problem Identification and Theoretical Framework

	1-4	5	6	7	8	9-10
Research problem, research aim and question, scientific and societal relevance	The research problem does not concern a socio-technical issue and is not related to sustainability/ sustainable innovation. There is no or poor description of the research problem leading to a clear problem statement. There is no relation to the research question/ aim or the literature does not match the problem, relevance of the research is not clear.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. Limited description of the research problem. There is no relation to the research question/ aim or the literature does not match the problem, relevance of the research is not clear	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a broad research problem and it is connected with relevant literature to the research question/aim. The relevance of the research is described.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear research problem and it is connected to the research question/aim. The relevance of the research is described. Gap in the literature is identified.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear and concise research problem which is clearly connected to the research question/ aim; the relevance of the research is substantiated. Scope and boundaries of the research are well defined.	The research problem concerns a socio-technical issue and is related to sustainability/ sustainable innovation. There is a clear, concise and original research problem which is clearly connected to the research question/aim. The student substantiates the scientific and societal relevance of the research. Scope and boundaries of the research are well defined (boundaries).
	☐	☐	☐	☐	☐	☐

THE ASSESSMENT FORMS CAN BE FOUND ON CANVAS UNDER MODULES.
PLEASE DOWNLOAD THE FORMS THERE FOR USAGE.

3

A. Quality Problem Identification and Theoretical Framework

	1-4	5	6	7	8	9-10
Description of relevant literature	A review of the relevant literature is missing, incomplete or unclear.	Review of the relevant literature is incomplete or unclear.	The relevant literature is described	The relevant literature is described, connected to the research aim	Thesis contains critical review of relevant literature, connected to the research aim.	Thesis contains crititcal review of relevant literature and connects to ongoing debates and the reserach aim.
	☐	☐	☐	☐	☐	☐
Relevant theories and key concepts	Role of theory is not clear. Literature used is (partly) irrelevant and/or insufficient to answer the research question. And/or theoretical concepts are misunderstood	Role of theory is insufficiently clear. Literature is only partially relevant. And/or, theoretical concepts are misunderstood	The main theoretical concepts and their relations are clearly defined and linked to the research question/aim and literatures. Theoretical concepts are understood and application is sufficient	The main theoretical concepts and their relations are clearly defined and linked to the research question/aim and literatures. Theoretical concepts are understood and application is sufficent to good.	The research question/aim is reformulated in theoretical terms. The main theoretical concepts and their relations are clearly defined and connected to literatures. Theoretical concepts are understood and application is good.	The research question/aim is reformulated in theoretical terms. The main theoretical concepts and their relations are clearly defined and connected to relavent literatures and theoretical debates. Theoretical concepts are understood and application is excellent / original.
	☐	☐	☐	☐	☐	☐

Grade Part A	Explanation (obligatory)

4

B. Quality of Research Methods

	1-4	5	6	7	8	9-10
Scientific approach	The chosen research method(s) do not correspond (well) to the problem statement. No structured description (reproducible steps) of the research method.	Most of the chosen research method(s) and instruments do not correspond well to the problem statement. No structured description (reproducible steps) of the research method.	The research approach is mostly adequate (one or more suitable research methods) corresponding to the problem statement. The steps of the research method are listed.	The research approach is adequate. The chosen research method(s) and instruments correspond to the problem statement and are based on literature. Steps of research method are listed and basically explained. Validity of research approach is discussed. Researcher shows sufficient scientific attitude (applying (inter)disciplinary literatures, concepts and methods)	The research approach is adequate. The chosen research method(s) and instruments correspond to the problem statement and are based on literature. The chosen research approach is justified by the student. Steps of research method are listed and explained in detail. Validity of research approach is critically discussed. Researcher shows good scientific attitude (applying (inter) disciplinary literatures, concepts and methods)	The research approach is adequate and thoroughly considered. Choices are clearly justified from the perspective of the problem statement and literature. The research approach stands out because of originality and/or complexity. Steps of the research method are listed and explained in detail. Validity of research approach is critically discussed. Researcher has an excellent scientific attitude (applying (inter)disciplinary literatures, concepts and methods)
	☐	☐	☐	☐	☐	☐

Grade Part B	Explanation (obligatory)

5

C. Quality of Research Execution

	1-4	5	6	7	8	9-10
Data Collection and Data Management	The student was not able to collect data and/or process data or the collection of data is too limited.	The collection of data is too limited and/or there are doubts about the validity and reliability of the data, prompted by the unclear or incorrect way in which the student acquired and/or processed the data (not transparent)	The collection of data is sufficient. There is sufficient faith in the validity and reliability of the data and its processing (most times transparent)	The collection of data is sufficient. There is sufficient faith in the validity and reliability of the data and its processing (most times transparent)	The collection of data is substantial. There is faith in the validity and reliability of the data and its processing (transparent), based on an adequate justification.	Extensive data collection. The acquisition of the data took place in an adequate fashion. The way in which the data have been processed has been meticulously documented and justified.
	☐	☐	☐	☐	☐	☐
Data analysis and results	No or limited analysis and/or interpretation. Claims cannot be checked. There is no or limited description of the research results or the presented results do not logically follow from analysis.	Results follow broadly from analysis, but without interpretation.	Correct analysis. Results follow from analysis. Analysis and interpretation are superficial	Correct analysis. Results follow logically from analysis. Results are presented clearly and organized, factual and with interpretations.	Correct and thorough analyses of the data. Results follow logically from analysis. The results are presented clear and well organized, factual and with interpretations. and presented in relation with research questions.	Advanced and original analyses of the data. The results follow logically from analysis. The results are presented are clear, very well- organized (emphasizing the essence of the research) and factual. The meaning of the results is described and explained in detail. Tables and figures are well integrated in the line of argumentation. Critical reflection on results and the relation between concepts.
	☐	☐	☐	☐	☐	☐

Grade Part C	Explanation (obligatory)

6

D. Quality of The Conclusion and Discussion

	1-4	5	6	7	8	9-10
Conclusions and implications	No or (very) weak conclusions. Not based on data analysis and not linked to the research questions. Or conclusions are drawn providing only partial answers to the research question, repeat results or are not substantiated by results or relevant literature.	Some conclusions are drawn providing only partial answers to the research question. Conclusions merely repeat results or conclusions are not substantiated by results or relevant literature.	Conclusions are based on analysis and linked to the research questions. The research questions are answered.	Conclusions are based on analysis, linked to the research questions, and substantiated by results and relevant literature.	Conclusions are based on analysis, clearly linked to the research questions, and well substantiated by results and relevant literature. Conclusions are formulated exactly. Scientific relevance is addressed. Strategic and/or policy implicatons are formulated	Conclusions are based on analysis and clearly linked to the research questions. Conclusions very well substantiated by results and relevant literature on a higher level. Results are positioned in broader debates in innovation studies literature. Conclusions are formulated exactly and concise, grouped in a logical way. Identifies the scientific contribution of the research as wel as strategic and/or policy implications.
	☐	☐	☐	☐	☐	☐
Recommendations	No or unsupported recommendations.	Recommendations are to limited and/or the presented recommendations do not logically follow from results.	Recommendations are sufficient but are superficial. Recommendations follow from results.	Recommendations are clear and follow logically from results. Recommendations are superficailly linked to the scientific debates in innovation studies literature or to the strategic and/or policy implications mentioned in the conclusion.	Clear, well-formulated, and advanced recommendations. Recommendations follow logically from results. Recommendations are linked to the scientific debates in innovation studies literature or to the strategic and/or policy implications mentioned in the conclusion.	Recommendations are well-formulated, advanced and original. Recommendations follow logically from results. Recommendations are linked to the scientific debates in innovation studies literature and to the strategic and/or policy implications mentioned in the conclusion.
	☐	☐	☐	☐	☐	☐

7

D. Quality of The Conclusion and Discussion

	1-4	5	6	7	8	9-10
Critical reflection on the research performed	No critical reflection on the research. Reflection only touches trivial or very general points of criticism. Or student identifies only some possible strengths and weaknesses and/or points at strengths and weaknesses which are in reality irrelevant or non-existent	Student identifies only some possible strengths and weaknesses and/or points at strengths and weaknesses which are in reality irrelevant or non-existent	Student indicates main strengths and weaknesses in the research.	Student indicates main strengths and weaknesses in the research and is able to weigh their impact on the main results relative to each other.	Student indicates all strengths and weaknesses in the research and weighs them relative to each other. Furthermore, (better) alternatives for the research methods used are indicated. The student reflects on how technical and social science knowledge integration contributed to results.	Student is not only able to identify all possible strengths and weaknesses in the research, but is also able to indicate which strengths and weaknesses affect the conclusions the most. Student indicates all strengths and weaknesses in the research and weighs them relative to each other. Furthermore, (better) alternatives for the research methods used and suggestions for future research are indicated. The student reflects on how technical and social science knowledge integration contributed to results.
	☐	☐	☐	☐	☐	☐

Grade Part D	Explanation (obligatory)

Proceed to the next page.

Finalisation

Final Comments

Grade Final Report*

First print this form and then sign it. Afterwards, scan the signed document and e-mail to the first supervisor.

* Please fill in the grade of the final report manually. This grade is based on the grades of block A, B, C and D, taking into account the phase of the project. This grade is not necessarily a calculated average of the grades of block A, B, C and D. Add Final comments to clarify possible differences.

Note: Grade Final Report is expressed in 0.1 grades and is an advice to the first supervisor.

This is the end of the Bachelor's End Project (BEP) Final Evaluation Form.

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Appendix J Request for Extension BEP

EINDHOVEN UNIVERSITY OF TECHNOLOGY
REQUEST FOR EXTENSION BACHELOR END PROJECT
DEPARTMENT OF INDUSTRIAL ENGINEERING & INNOVATION SCIENCES

Personal Information

Name:	
Student Number:	

BSc Program:	BSc	Industrial Engineering
	BSc	Psychology & Technology
	BSc	Sustainable Innovation
Name of the Mentor / First Assessor:		

Start date Bachelor end project:

Extending until:

Reason extending:

Motivation:

Signature Mentor / First Assessor: Date:

_____

Signature Student   Date:

_____

To be completed by the Examinations Committee

Approval of extention:

Explanation:

On behalf of the Examinations Committee   Date

This document can be send to IE: ieis.examination.committee.ie@tue.nl or IS: ieis.examination.committee.is@tue.nl or hand it at Atlas 3.332